

NetworkWorld

THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING

TOP GUNS Q&A

Dell Computer CEO Michael Dell sizes up server market. **PAGE 20**

New FORE CEO Thomas Gill eyes ATM and more. **PAGE 10**

Questions slow virtual private network plans

By Tim Greene
Orlando

Not ready for prime time. That's the state of virtual private network (VPN) offerings, according to a dozen network administrators interviewed by *Network World* last week at Gartner Group, Inc.'s remote access conference here.

While the net administrators admit they haven't thoroughly checked out the hardware, soft-

ware and services needed to make VPNs work, too many questions remain for them to trust VPNs with sensitive corporate information just yet.

The administrators certainly don't want to be the ones blamed if VPN shortcomings result in stolen data or users who are disgruntled by poor performance.

Their top concern: security. *See VPN fears, page 136*

Is Navigator too slow for Win98?

By Andy Eddy and John Cox

Netscape Communications Corp. already expects a tough battle against Microsoft Corp.'s upcoming Windows 98 release, with its built-in browser. But what Netscape might not be prepared for is the dramatic performance edge Microsoft may have in the Windows 98 browser market.

Based on interviews and hands-on experience, it has become clear that Microsoft's integration of the Internet Explorer browser into the operating system lets the browser start up faster — often a lot faster.

Netscape could get a respite if the U.S. Department of Justice, or the group of individual states reportedly banding against Microsoft, delay the release of Windows 98. But that

action is far from certain.

A producer at a game publisher in California said the Internet Explorer browser benefits by having many of its resources load up along with

the rest of the operating system at boot up. "Clearly the start-up is enormously faster on IE than on Navigator. It's probably prelaunching, precaching and

See Browsers, page 134

Net giants tout VPN tools

By Tim Greene
Las Vegas

Virtual private network (VPN) products will take center stage at NetWorld+Interop 98 this week as major players and start-ups alike spotlight their latest wares for securely accessing corporate networks over the Internet.

Industry giants Bay Networks, Inc., Ascend Communications, Inc. and IBM, as well as newcomers Indus River Networks, Inc. and Assured Digital, Inc., hope to steal the

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NETWORLD+INTEROP 98

- PSINet to deliver managed fire-wall service. **Page 8.**
- WorldCom to bundle frame relay into one-stop shopping package. **Page 8.**
- Olicom to launch ATM backbone switch. **Page 16.**
- Start-up IXIA to tackle Gigabit Ethernet testing. **Page 20.**
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- Daily NetBuzz commentary
- A show planner



In-Site MCI's SNA-to-IP migration easier than expected

By Marc Songini
Colorado Springs

MCI Communications Corp.'s Glen Tindal has won a political and religious war — with no bloodshed.

Almost three years ago Tindal and his 15-member IS team embarked on a network crusade to convert the company's huge SNA backbone to TCP/IP. *Network World* first chronicled the MCI conversion in 1996 (NW, Oct. 7, 1996, page 1).

The driving idea behind the conversion was to build an IP-routed backbone and push SNA to the edge of the new environment.

See MCI, page 134

SPECIAL SECTION

Assessing Switching

Layer 3 switching has, in a sense, completed a circle — from routing to bridging to switching and back to routing again — giving us pause to reflect on where switching has brought us and where it's headed. In this special section, we examine the Layer 3 phenomenon; assess the state of ATM and token-ring switching, and provide insight into where switching will take us.

Inside you'll find:

- **WHERE WE ARE:** An assessment of where the various technologies stand and where they're going. **Page 75.**
- **WHERE WE'VE COME FROM:** A look back with the inventor of Ethernet switching. **Page 76.**
- **WHERE WE'RE GOING:** How much faster can switching get? **Page 78.**
- **LAYER 4 SWITCHING:** What it is and what it isn't. **Page 80.**
- **THE BIG FOUR:** Or will it be three, or two? **Page 82.**
- **10 TIPS:** Your guide to successful switching. **Page 84.**

Keep it simple.

Get pieces that work together.

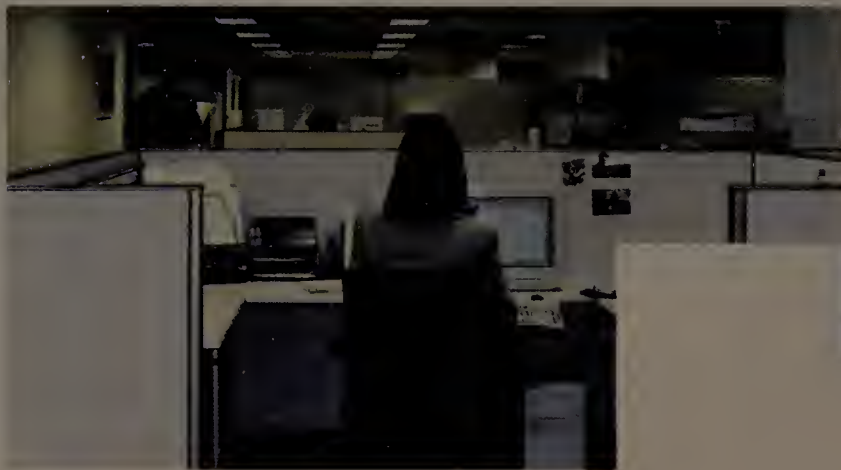
On one line you've got a user who can't get on the Internet.

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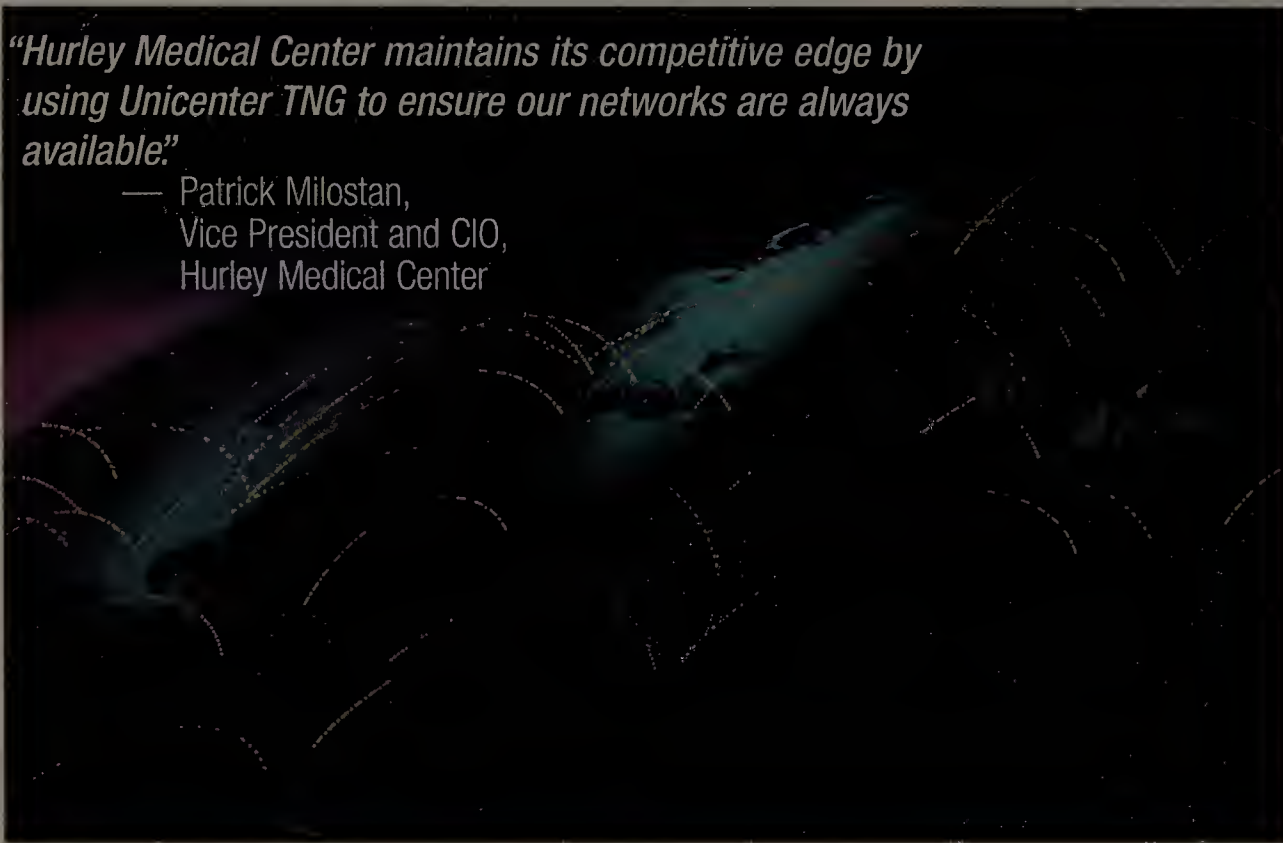
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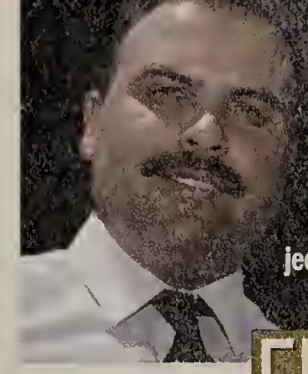


GOING PUBLIC

Salomon Smith Barney's Ted Jestin pushes ahead with public-key infrastructure technology at the financial firm. Page 57.

ON A NEW PATH

3Com strengthens its WAN switching story with the new PathBuilder product line. Page 46.

NO WALK IN THE PARK

Mark McCosh has his hands full as project leader of network services at Universal Studios Florida theme park. Page 99.

FIND IT FUSION

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www.nwfusion.com

This Week

Only on Fusion

The Web. Microsoft.com is one of the world's most frequently visited Web sites. But it started as a server under somebody's desk. Its Webmasters discuss how the site grew — and how they're getting ready for a new tidal wave of traffic when Windows 98 is released. **DocFinder: 6949**

Web sites. SiteWatch this week compares Sun's and Hewlett-Packard's Web sites. Which is easier to use? **DocFinder: 6950**

NetWorld+Interop 1. NetBuzz's Chris Nerney this week will wing his way to Las Vegas for the show. All that flapping gets him a little antsy, so he'll be providing exclusive daily show coverage starting Wednesday morning. See who's hot — and who's getting out of hand. **DocFinder: 6947**

NetWorld+Interop 2. *Network World* and *Fusion* reporters will team up to provide breaking news from the show, along with coverage of keynotes and key sessions, such as our Thin-Client Face-off and the second annual NetBowl trivia challenge. **DocFinder: 6948**

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How to contact us

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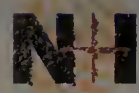
Switching grows up

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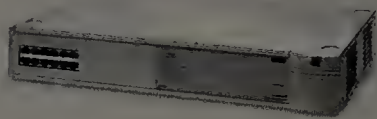
Analysis: How the MCI/WorldCom merger will spur competition and 'Net growth. Page 89.

Review: HP's AdvanceStack 800T is a small switch with big ideas. Page 95.

News briefs, May 4, 1998

**This week at NetWorld+Interop 98:**

● 3Com Corp. will unveil its Baseline family of low-cost switches and hubs designed for small and mid-size networks. The product line, a branch of 3Com's existing SuperStack II family, includes 12- and 24-port unmanaged hubs that cost \$22 and \$17 per port, respectively. Also new are 12- and 24-port 10/100M bit/sec hubs that cost \$75 and \$58 per port, respectively. New switches include the 12- and 24-port SuperStack II Baseline 10/100s, autosensing devices that cost \$133 and \$99 per port.



SuperStack II Baseline 12-port switch

3Com will also announce the SuperStack II Switch 3800, a 24-port 10/100M bit/sec device that includes a Gigabit Ethernet link and support for wire-speed routing at up to 5 million packet/sec. The 3800 costs \$9,995, or \$399 per port.

© 3Com: (408) 764-5000

● Toshiba Corp. will demonstrate its Dynamic Virtual Private Network (DVPN) wares. DVPN is aimed at supplying corporations with hardware and software to connect mobile workers securely and easily over the Internet to corporate resources. The company will show off its Cell Switched Router, which uses an ATM engine for packet forwarding. The device is expected to anchor large VPN environments.

© Toshiba: 81-3-3457-2105

● VeriSign, Inc. will announce VeriSign OnSite for IPsec, a certificate validation service to support IP Security-based gateways, firewalls and remote-access devices from Cisco Systems, Inc., Bay Networks, Inc., Check Point Software Technologies, Ltd., Ascend Communications, Inc., TimeStep Corp., VPNet Technologies, Inc. and Shiva Corp. VeriSign anticipates the certificate service will be available in the third quarter.

© VeriSign: 650-429-3424

● RND Networks, Inc. will introduce its Web Server Director for Network Proximity (WSD-NP). The new product combines load balancing and geographic redirection, which provides worldwide enterprises with the ability to coordinate content on various servers around the globe. The package also directs traffic to the least busy server closest to the user's location. Multiple WSD-NP units communicate with each other to maximize load-balancing coordination. Pricing for the device starts at \$23,500, and the product is slated to ship in June.

© RND: (905) 643-6244

Kennard: Carriers must pay attention to Y2K issues

■ Federal Communications Commission Chairman William Kennard last week raised an alarm about carriers' ability to avoid the Year 2000 problem. "We are very concerned that the Year 2000 problem has the potential of disrupting communications services worldwide," Kennard told a Senate Commerce Committee at a hearing on the millennium bug. Individual banks, the American Bankers Association and the Federal Reserve Board have been asking the FCC for oversight action since last October, said Colleen Boothby, an attorney in Washington, D.C. AT&T released a statement saying the company will be ready on time, but Boothby said banks are especially concerned about local carriers' central office switches and SONET multiplexers.

IT heads say Win 98 delay would hurt industry

■ A group of top IT executives last week signed a letter to the U.S. Department of Justice arguing that any delay in the release of Microsoft Corp.'s Windows 98 operating system will hurt the industry. The list is a who's who of leading executives, including Andy Grove, chairman of Intel Corp.; Michael Dell, chairman and CEO of Dell Computer Corp.; Eckhard Pfeiffer, CEO of Compaq Computer Corp.; Lewis Platt, CEO of Hewlett-Packard Co.; and 22 others.

CA trains Unicenter to foresee future

Next edition of management product to gain neural network technology.

By Doug Barney

New Orleans

Computer Associates International, Inc. (CA) wants Unicenter to drive into the future, and customers seem more than willing to go along for the ride.

At last week's CA-World show here, some 25,000 attendees were regaled with tales of Unicenter network management software being given enough artificial intelligence oomph to predict the future health of their networks and eventually automate a good deal of network management.

The next major revision of Unicenter TNG, dubbed Unicenter TND (The Next Dimension), will gain more smarts through the use of artificial intelligence called neural network technology.

Predicting behavior

Neural network technology can recognize patterns of behavior and learn to predict what computer systems might do next. Unicenter TND will present this information to network and systems managers via the Real World 3-D interface.

Unicenter TND also allows users to add a time element to network management. The system can collect historical information and then determine how important events correspond to particular time periods.

For example, the software

"[Unicenter TND] means we can replace productivity with predictability," said Alain Masson, general manager of computer services and software company Syseca, Ltd.

could predict a particularly high load at a specific time. The system could then urge a network manager to grab more bandwidth or reduce the load wherever possible.

Although Unicenter TND will not be out until next year, CA

officials aren't making anxious users wait for all the goodies. Some of the product's agent programs will ship this year as add-ons for today's Unicenter TNG, said J.P. Corriveau, senior vice president of CA's Technology Integration Group.

In fact, some users may get the agents as early as this summer in

to be predictive, it has the potential to be wrongly predictive," said Mark Moon, network analyst for Sabre Computer Services, in Fort Worth, Texas.

Bundles away

Besides adding predictive qualities to Unicenter, CA hopes to make its systems management

News from around CA-World**Computer Associates announcements made last week include:**

- Unicenter TND, a new network management package that includes time-based analysis and neural network-style analytic and predictive agents
- Bundling of Unicenter TNG Framework with Microsoft Windows NT 5.0 and all Compaq servers
- Harmony, a software architecture that provides a common interface to CA and other vendors' legacy applications
- Editions of Unicenter aimed at departments and smaller organizations

FUN FACT: With the jazz festival in town, Computer Associates faced a severe shortage of hotel rooms in New Orleans. Its answer? Sail some 5,000 employees from Florida to the Big Easy on cruise ships and put them all up on board. The company used another two ships to house employees that flew in.



the form of "neugents" that analyze performance and availability, Corriveau said. It is not likely that CA will port these agents to other vendors' management platforms, he said.

A hungry crowd

Maybe it was the fine Louisiana hospitality, the food, or just the glow from Bourbon Street festivities, but show attendees ate up the CA news — especially the promise of a more predictive Unicenter tool.

"It's really sharp, the way they are going," gushed Linda Jones, a systems analyst/programmer for the Federal Aviation Administration, in Oklahoma City, Okla. "It is neat to be able to see where the problem is going to lie beforehand."

"[It means] we can replace productivity with predictability," explained Alain Masson, general manager of Syseca, a subsidiary of Thomson-CSF, a European electronics concern.

But not all attendees were so sure.

"Any time something is going

product ubiquitous by establishing new bundling arrangements. Longtime partner Microsoft Corp. has agreed to add a copy of Unicenter TNG Framework, a scaled-down version of the full Unicenter TNG, to every copy of Windows NT 5.0.

And one day after Microsoft CEO Bill Gates disclosed this deal, Compaq Computer Corp. CEO Eckhard Pfeiffer promised to bundle Unicenter TNG with all Compaq servers, past and present.

As exciting as all this bundling sounds, skeptics point out that CA already makes Framework available free as a lure to the full version of Unicenter.

Keeping its word

Additionally, CA finally is making good on its promise to deliver the Jasmine object-oriented database as a repository for Unicenter data.

CA this summer will deliver Jasmine integration with the current version of Unicenter and will link Jasmine even more tightly with Unicenter TND. ■

Take everything you know about frame relay and forget it.



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PSINet lowers price threshold for security

NH By Denise Pappalardo

PSINet, Inc. this week will unveil a fully managed security offering with some of the lowest rates in the business.

The ISP's new service, SecurityCentral, will offer 24-7 security monitoring and management, proxy server filtering, user authentication, reporting features and a new service-level agreement (SLA).

And PSINet's price tag of \$600 to \$800 per month, per site is one of the lowest on the market, experts said.

Users may be in a buying mood. "We will probably look very seriously at [PSINet's] new service, primarily because security is such a big issue with our

CEO," said Glenn Botkin, information systems engineer at Galaxy Scientific, an Egg Harbor Township, N.J. engineering firm.

Security was also one of Galaxy's biggest concerns when the

company developed its intranet, Botkin said. "We have one firewall deployed that we use as our guardian. We would have deployed more firewalls, but we were not interested in paying

\$20,000 per site, which was the cost when we first looked." If Galaxy could get managed service for less than \$1,000 per month that would be quite a bargain, Botkin added.

More bang for your buck

With SecurityCentral, PSINet is rounding out its security service offering with a mid-range service that includes a new service-level agreement.

	Security services	Primary security hardware/software	Additional features beyond 24-7 management	Price per month, per site
Mid-range	SecurityCentral	WatchGuard Technologies' FireBox security appliance	Filters and user authentication configured remotely, and SLA	\$600-\$800
High-end	SecureEnterprise	Trusted Information Systems' Gauntlet firewall server	On-site configuration of filtering and authentication	\$1,600
Low-end	RouteWaller	Proteon's firewall router	Remote dial-up authentication configurations	\$250

therefore keeping costs relatively low," he said.

And instead of having to send an engineer to every site where a customer needs a firewall, the ISP can simply send a device, which is preconfigured to the customer's specifications.

A technician at PSINet's security facility can turn on the device using WatchGuard's Global Security Manager software.

Comparison shopping

PSINet's existing SecureEnterprise service is similar to SecurityCentral but costs about twice as much per month. This is mainly because SecureEnterprise features more expensive hardware and on-site maintenance, Neugass said.

Prices for competitors' services can be even higher. For instance, GTE Internetworking's Site Patrol managed firewall service starts at \$2,500 per month, per site.

All of PSINet's managed security services are controlled from its Security Performance and Response Team (SPART) center in Troy, N.Y., Neugass said. SPART is staffed with at least 10 security experts at all times.

PSINet's SLA includes the guarantee that someone will respond to a customer's problem in "a certain amount of time," Neugass said. Firm details about the SLA, however, will not be available until next week when PSINet officially launches the service.

© PSINet: (703) 904-4100

WorldCom bulks up integrated access service

Carrier set to add frame relay to Internet offering; voice, 'Net access already included.

NH By Denise Pappalardo

So you want to simplify your life. You want to get one bill for your frame relay, local, long-distance and Internet access services, but your carrier keeps telling you "we're working on it."

Well, WorldCom, Inc. has been working on it, and it's now available.

This week at NetWorld+Interop 98 in Las Vegas, WorldCom is expected to announce that its Intelnet customers will now be able to add frame relay traffic onto the same dedicated connection that carries their local and long-distance voice and Internet access traffic. And users will get one integrated bill for all of these services.

The idea is to make it easier for mid-size companies to manage all of their telecommunications services.

"Adding frame relay to the mix is good news to business users," said Hank Levine, a Washington, D.C. lawyer specializing in negotiating telecommunications service contracts for major corporations.

Mid-size companies, typical customers of Intelnet and other integrated access service packages, usually lack large technical staffs. Integrating yet another service onto the same pipe and invoice will free time so staffers

can deal with more important matters, Levine said.

Intelnet customers also have the option of ordering a separate frame relay connection if they want more bandwidth dedicated solely to data traffic. Yet users will still get a single bill that will include charges for their separate frame relay pipe and for

art, vice president of consulting at TeleChoice, Inc., a Verona, N.J.-based consulting firm. Because WorldCom has been busy acquiring companies and merging their facilities with its own, Heckart said it's amazing that WorldCom would be one of the first carriers to integrate its frame relay and voice billing systems.

The three major domestic carriers — AT&T, MCI Communications Corp. and Sprint Corp. — are still trying to integrate their frame relay and voice billing processes.

While all three companies say they are close to offering this feature, none have it today, and only MCI has integrated its Internet access billing.

Users do have some integrated options from carriers such as Teleport Communications Group, but Teleport's service offering, which includes Internet access, local voice and frame relay, is limited to local areas.

Intelnet's service package, including frame relay service, is available in 83 metropolitan areas in the U.S. WorldCom has nearly doubled Intelnet's service area because it recently finished integrating Brooks Fiber Properties, Inc.'s local networks, which WorldCom acquired earlier this year. ■

A healthy mix

Intelnet users in 83 metropolitan service areas will have all of these services provisioned over a single dedicated connection and on one bill.

- ▶ Local voice
- ▶ Long-distance voice
- ▶ Internet access
- ▶ Private lines for data transmissions
- ▶ Frame relay services

their Intelnet pipe that may be carrying voice and Internet access traffic.

WorldCom is sprinting out into the lead with its Intelnet service, Levine said. While other service providers are offering similar packages, WorldCom is bringing much more to the table for users, he said.

"WorldCom has been integrating networks, staffs, services and billing systems for a number of years," said Christine Heck-

The new PSINet service uses WatchGuard Technologies, Inc. products, including the Firebox II and its software companion, Global Security Manager. The products will be announced this week at NetWorld+Interop 98.

Many managed firewall services are expensive because they run on PCs, and PC servers are difficult to manage remotely, said Richard Neugass, product manager for security services at PSINet, of Herndon, Va. "WatchGuard's product is a security appliance that is much easier to manage remotely,

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The winner will be selected based upon totally arbitrary criteria dreamt up on the fly by a group of *Network World* editors. All entries, including the winning bid, will be posted on www.nwfusion.com.

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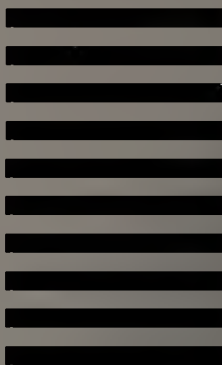
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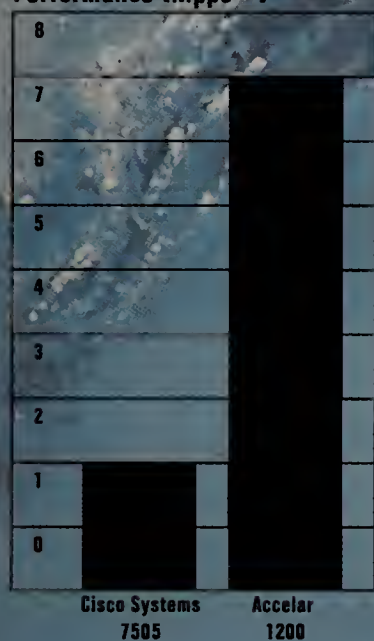
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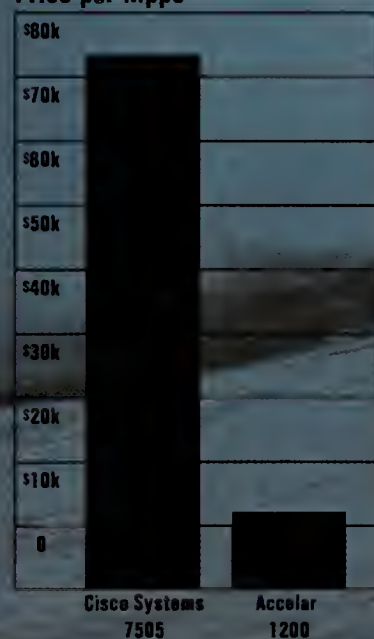


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Where e-mail doesn't deliver

EMA '98 panelists spotlight shortcomings of messaging software.

By Paul McNamara
Anaheim, Calif.

What's wrong with e-mail today? Plenty, according to panelists and audience participants who unloaded a seemingly cathartic stream of pet peeves last week during a pair of sessions here at the Electronic Messaging Association's EMA '98 conference.

These experts may be e-mail's biggest fans and know full well how far the medium has evolved. However, they also see their organizations making acquisitions, reaching out electronically to far-flung trading partners and deploying all kinds of new messaging-enabled applications. E-mail, these experts said, needs to get better to keep pace.

"We simply couldn't do business without [e-mail]," said Dennis Brenner, chief information officer at Fluor Corp., a global construction company in Irvine, Calif. As Fluor has expanded the

number of companies with which it wants to conduct business via e-mail, he added, "We can count on them having different [mail systems] than we do."

What he cannot count on is those systems working well with each other. Interoperability levels are already good for simple text exchanges, according to several speakers, but today's messaging products often do not play well together when the game gets more complicated.

EMA98

"The major interoperability issues that we face are on groupware [functions, such as] calendaring, public folders and the office suites," said Alan Matula, chief information officer at Shell Chemical Co. "The industry needs to think about interoperability on [that] level."

The day is coming, panelists

warned, when the typical e-mail user will see the same kind of message load — 200 to 600 messages per day — that power users already process. "Not only do we believe [such volumes are] realistic, we believe it's where the world is going to go," said David Crocker, principal at Brandenburg Consulting, in Sunnyvale, Calif.

It's that anticipated messaging onslaught, as much as today's considerable e-mail flow, that has administrators clamoring for better performance and more sophisticated features from messaging products.

Several conference participants spoke of the need for tools that enable administrators to help e-mail end users avoid the pitfalls that frustrate both groups.

"One user attached 2.1G bytes to an e-mail," Brenner said. "The system should have enough intelligence in there to

tell the user to do [the data transfer] another way." Vendors need to build sophisticated tools that are still simple enough "so that we don't have to have end users be experts," he added.

While bandwidth control and message store hogs were common themes throughout the sessions, few complaints drew more nods and murmurs than did those about attachments failing to work as intended.

"Every single one of our users drives us crazy because their attachments do not go through," said Anne Thomson Reed, chief financial officer for the U.S. Department of Agriculture. Vendors need to better equip their e-mail clients to open attachments of different types, or, at the very least, provide easy

pointers that end users can follow to find the tools they will need, panelists suggested.

Another recurring theme was the lack of reliable delivery-notification mechanisms in today's e-mail.

Walter Ulrich, vice president and senior director at Arthur D. Little, Inc., told of having sent an important e-mail to a nearby trading partner in Houston, only to have the e-mail bounced back at him with a message notifying him the e-mail had not been delivered. He sent the e-mail a second time with the same frustrating result, leaving him no choice but to call the intended recipient to arrange an alternate delivery method.

He was told the e-mail had been received... twice. ■

Netscape, Lotus air wares

By Paul McNamara
Anaheim, Calif.

Netscape Communications Corp. last week announced its new messaging server, code-named Troopers ISP, which the company claimed will allow ISPs to offer expanded features through the Internet Message Access Protocol.

For example, ISPs could offer e-mail, voice mail, fax and paging through one universal in-box using this new server, the company said. Netscape claimed the software will enable ISPs to support up to 500,000 users on a single Sun Microsystems, Inc. SPARC Ultra-Enterprise 3000 server.

The product, which was introduced at EMA '98 here, is based on technology Netscape obtained last year when the company bought Portola Communications, Inc.

Netscape officials said a variation of Troopers ISP is being developed for deployment in corporate enterprises, a market that industry experts say Netscape has had trouble penetrating. Demonstrating the scalability and feature performance of Netscape's new software in ISP environments will open doors to corporate accounts, company officials claimed.

The new server, which will become part of Netscape's SuiteSpot package, is now in a closed beta test. Delivery is expected in the second half of this year. No pricing was announced.

Also at the conference, Net-

scape rival Lotus Development Corp. made a pair of announcements.

The company's newly formed Mobile Communications Group released Pager Gateway 2.02. For the first time, this will give voice/data cellular phone users wireless access to Lotus Notes e-mail, calendars and address books stored on a Domino server. Pager Gateway, which costs \$3,058, works with AT&T's PocketNet service and cellular phones from Samsung and Mitsubishi.

Lotus also announced a series of Messaging Upgrade Packs — software applications and tools — designed to ease the transition from a number of legacy mail systems to Notes and Domino. The program targets users of IBM's OfficeVision, Verimation's MEMO, Fischer International's EMC2/TAO and Digital Equipment Corp.'s ALL-IN-1 systems.

The packages are scheduled to become available this quarter and most of them will cost \$4,995. More details can be found at www.lotus.com/messaging.

Separately, Novell, Inc. last week placed a new entry in the legacy mail migration sweepstakes. The company announced a 60% price reduction on its GroupWise messaging line for customers switching from competing products. Novell officials said the special deal is aimed primarily at Lotus' 14-million member installed base of cc:Mail users. ■

Reporter's notebook: Nice guys, obsession and sticky pads

Seen and heard at last week's EMA '98 conference:



Mr. Nice Guy

Netscape Communications Corp. CEO Jim Barksdale delivered his entire conference keynote with only a single, rather mild jab at Microsoft Corp. and nary a mention of monopolies or the U.S. Department of Justice. The speech received tepid reviews. ... So much for making nice.

T-shirt philosophy

CyruSoft International, Inc., makers of a graphically groovy Internet Message Access Protocol-based client called Mulberry, was raffling off one of the show's more fetching T-shirts. Emblazoned on a screaming yellow background was this simple inscription: "Email is my life. Way cool. Sad, but way cool."

Life change

In her conference-opening remarks, Martha Hanlon, chairwoman of the EMA board of directors and an MCI Communications Corp. executive, carried the e-mail obsession thread further. Last on her list of "Five Ways EMA Has Changed Your Life" was this unfortunate truism: You check your e-mail. It says, "No new messages." So you check it again.

Millennium madness

You might think this particular word would be considered poison from a public relations standpoint, given all the horror stories about the Year 2000 bug. Nevertheless, EMA's conference was defiantly subtitled "Messaging in the Millennium."

MESSAGING IN THE MILLENNIUM

Merger stumper

When vendors merge, the trade press turns to industry consultants for insight into the deals. So who do we turn to when consultancies merge? This was the dilemma last week after two such firms, The Burton Group and Rapport Communication, announced that they had married and taken the former's name. Seems like a good fit, said one reporter who doesn't know his own shirt size.

Worth noting

We may live in a wired/wireless world where e-mail is never far from our fingertips, but getting messages to many EMA attendees entailed using some rather low-tech tools: sticky notes and push-pins on a big cork board. The PDA vendors missed a valuable marketing opportunity here.



—Paul McNamara



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At FORE Systems, all switches are on and ready to go

New CEO Thomas Gill is keeping ATM focused but wants to embrace complementary net technologies, too.



Early this year FORE Systems, Inc. quietly promoted financial whiz Thomas Gill to president and CEO, replacing the more technical company founder Eric Cooper, who remains as chairman. *Network World* Senior Editor Robin Schreier Holman spoke with Gill about his style and his plans to expand FORE beyond the world of ATM.

FORE has always been known as an ATM equipment supplier. Are you branching out a little bit more?

Yes, we are. Our strategy is to continue to stay focused on ATM in the enterprise, but also to expand our solution on the edge. We've got a terrific edge strategy today and we want to continue to focus on how to expand that product line.

It seems that there has been a shift away from thinking about pure ATM or Ethernet environments to using ATM in the backbone and Ethernet to the desk-

top. Are you seeing that same evolution?

In the core of the backbone, we are very adamant about ATM as the right backbone infrastructure to support applications and all the scalability capacity requirements over the long term. Long term is three to five years in a planning cycle for a network manager or an IT manager.

On the edge of the network, we have a bit of a different philosophy, where we will work with customers and understand what applications they're running, what some of the drivers are and the needs are in this business over the next several years. And quite often customers of ours will buy 10Base-T Ethernet for applications that require it. And in the same customer network they may have OC-3 ATM at the desktop. It all depends on their departmental requirements.

We're the only company that can actually offer very attractive desktop ATM and at the same time offer very competitive switched Ethernet, at the

desktop or in the wiring closet.

So what kind of new edge products can we expect to see?

Well, we've got a big focus on two areas in the LAN. One is stackable switches, 10/100 stackable switches that are priced competitively with today's market. Today we have a modular product that is very, very solid and sells very well but is under a bit of price pressure on the edge, and we continually adjust the pricing to bring it down.

Does FORE plan to build 10/100 stackables itself?

Currently we're just adjusting our price on our existing products to meet the requirements in the marketplace today. Over the long term, we've got development efforts under way to bring products to market. We have other vehicles to get to market quicker as well, which could include partnerships or potential acquisitions.

Can customers easily migrate to ATM from Ethernet, or does the move require a forklift upgrade?

If the customer has a large installation of shared hubs, typically the shared hubs can aggregate onto a high-density closet-type Layer 3 switch that we offer today. Our PowerHub product line can do that very well. We'll offer next-generation switches that can facilitate this very well. It's essentially bringing shared hub traffic onto an ATM backbone infrastructure.

With your new ASX-4000 ATM backbone switch, there's a definite migration path built in. You start high but you can go much higher. What kind of customers are you going after with this product?

There are two initial markets for that particular switch. One is high-end large enterprises — you'd be surprised at the number of our current enterprise customers who are very interested in that switch, particularly in the U.S. federal government and many Fortune 100 corporations.

And what's interesting is that the ASX-4000 does not require you to take any equipment out of the network. You can essentially drop it into the center of the network, get a significant boost in capacity and performance, while at the same time interfacing our ASX-1000s and 200BXs into the ASX-4000.

And in regard to the service provider market, the interest right now is the Inter-

net service providers in particular, but also the service providers that essentially are transporting IP and have a business around data.

When you talk to customers, what are they looking for FORE to build?

A lot of the customers that we're working with today have FDDI backbones. They have a big router infrastructure.



It's complex to manage, it's costly, it's at capacity, and it's essentially hitting the wall.

Some of the FDDI backbones are at 99% capacity, and they can't take the corporation forward. So we have the ideal opportunity to come in and, at a very attractive price point, upgrade their backbone. [We can] bring them a very attractive edge solution that integrates well into the ATM or cell-based backbone infrastructure.

What are you doing with Microsoft?

We are supplying their entire headquarters campus with ATM backbone switches, and we've been a part of their network for almost a year.

Their entire campus?

Their entire campus, yes. It's a fairly large and expensive network. Microsoft is a strategic account, a very important customer of ours.

Do you think one of the barriers to ATM, high price, is dropping away?

I think so. Let's start out on the desktop first. We've rolled out very attractive desktop pricing for OC-3. Our OC-3 pricing per port is about \$400, and the adapter card is just about \$500. That is very attractive when compared to Fast Ethernet. And we will continue to bring that pricing down.

There has been lots of speculation in the market about an acquisition. Is FORE for sale?

I would not take the job as CEO and president of the company if I was asked to take the role to just sell the company. I would not accept the position to do that. We're building the company for the long term. ■

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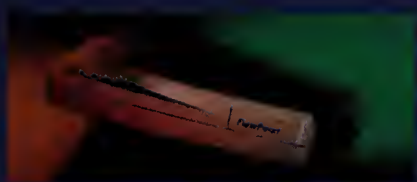
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Intel readies Gigabit Ethernet gear

By Scott Lajoie
Hillsboro, Ore.

Intel Corp. last week continued to push into the network equipment market by officially introducing its first Gigabit Ethernet products.

The company announced Express Gigabit Switch, a seven-port 1000Base-SX device that includes an expansion slot that can be filled with an extra Gigabit Ethernet port or a mix of lower speed ports. The company expects customers to use the switch to interconnect 10M bit/sec and 100M bit/sec switches and to provide servers with high-speed pipes.

The device boasts a 32G

bit/sec nonblocking switch fabric, which was designed in conjunction with Lucent Technologies, Inc. and is based on the Cajun switch architecture obtained by Lucent when the company bought Prominet Corp. earlier this year.

Intel complemented the new switch with a Gigabit Ethernet card called the Pro/1000 Gigabit Server Adapter.

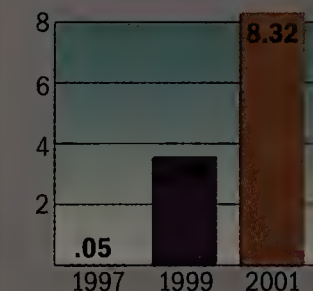
Intel first showed the products in February at a company event in San Francisco, where Intel rolled out its Layer 3 switches.

The new Express Gigabit Switch is the most expensive piece of network gear to be

offered by Intel to date — the switch sells for \$11,995, or a little less than \$1,500 per port. This price is competitive with existing

INTEL ENTERING HOT GIGABIT ETHERNET MARKET

Number of Gigabit Ethernet LAN ports shipped (in millions)



SOURCE: ELECTRONIC TREND PUBLICATIONS, SAN JOSE, CALIF.

Borland changes name and direction

Now called Inprise, the company will target the application server market.

By Andy Eddy
San Francisco

Maybe the company didn't want to be confused with Tim Taylor's sidekick on TV's *Home Improvements* sitcom.

Borland International, Inc. last week said it is ditching its well-known monitor and renaming itself Inprise Corp., in an effort to better describe the 15-year-old company's new mission of offering enterprisewide products.

Company Chairman and CEO Del Yokam said the company came up with the name with the assistance of Lexicon Branding, Inc., which has also come up with the names Pentium, PowerBook and, well, Zima. Inprise means "integrating the enterprise," Yokam said during a press conference at the

San Francisco Museum of Modern Art.

The newly named company laid out a growth strategy under which Yokam said he hopes to turn Inprise into a \$500 million business within three years; Borland recently shifted its fiscal year to match the calendar year and reported \$127.5 million in revenue

for the last three quarters of 1997. The company, which has struggled in recent years, has posted three straight profitable quarters, and revenue has grown in each of the last four quarters.

Yokam said in the future, Inprise will generate revenue from the company's existing development tools and middleware as well as via several new offerings. One of the new packages will be an enterprise appli-

cation server that will provide a middle layer between client terminals and mainframe and legacy systems. While Inprise didn't detail the time frame for the server's release, executives did indicate the product would be rolled out in phases this year.

Inprise will also launch a professional services business, which the company said will

offerings from vendors such as 3Com Corp., which sells its SuperStack II Switch 9300 for \$1,249 per port.

Analysts said Intel's entry into the Gigabit Ethernet market should keep other vendors on their toes, given that Intel has already pressured vendors to lower their prices in other segments of the Ethernet switch market.

"Intel is positioning itself to drive down the prices of Gigabit products from the start," said Shannon Pleasant, an analyst with Scottsdale, Ariz., market research firm In-Stat, Inc.

Intel plans to ship its new Gigabit Ethernet gear in June. In addition to the switch and network interface card, the company is offering a two-port 10/100M bit/sec switch module

work with system integrators and resellers to offer consulting, training and technical support for enterprisewide issues.

Inprise had little choice but to chart out a dramatic new growth plan, according to Jeetu Patel, vice president of research at Doculabs, a research firm in Chicago.

One ramification of the move could be that Inprise will be competing more with traditional partners such as Netscape Communications Corp., he said.

©Inprise: (408) 431-1000

Olicom adds ATM switch

By Robin Schreier Hohman
Dallas

Olicom, Inc. this week will unveil a new enterprise backbone ATM switch aimed at integrating ATM backbones with traditional token-ring and Ethernet LANs.

The CrossFire 9200 ATM Switch gives users a higher capacity — up to 5G bit/sec of throughput — than the company's entry-level, 2.5G bit/sec model 9100.

Users can connect existing token-ring or Ethernet LANs to the 9200, which can then send the traffic over an ATM backbone. The 9200 supports the ATM Forum's LAN Emulation (LANE) standard, which lets legacy LAN traffic traverse an ATM net. On the WAN side, the non-blocking 9200 switch can be packed with up to 32 ports of OC-3 (155M bit/sec), seven ports of OC-12 (622M bit/sec) or any combination of the two.

While token ring is not

exactly gaining new users, there are a number of big token-ring shops that would find it financially catastrophic to change technologies now. With an eye on that market, Olicom last week dropped the price on the CrossFire 8601 Token-Ring Desktop Switch to \$250 per port, down from \$275. The CrossFire 8601, which was announced in January, has 20 ports.

Olicom is hoping users will replace existing token-ring hubs with the 8601, giving dedicated bandwidth to the desktop. Even though the price reduction is not large, Olicom had the lowest-priced token-ring desktop switches anyway, according to Larry Howard, an analyst at Infonetics Research Inc., in San Jose, Calif.

"There's nobody even really close to their price range," Howard said, noting that most token-ring switches sell for \$600 to \$700 per port.

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for \$1,195 and a four-port 100M bit/sec switch module for \$1,595.

The switch also features DeviceView, a graphical user interface-based program for monitoring the device.

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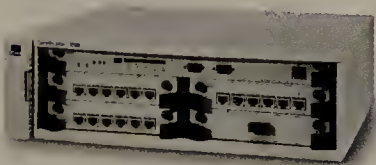
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■ **Fluke Corp.** last week announced software for monitoring TCP/IP, IPX and Net-BIOS switches, routers, servers and clients. Fluke's Network Inspector, which analyzes network segments the same way the company's LANMeter devices do, is geared to small and mid-size businesses or for use as an easy-to-use companion to larger enterprise management systems. Network Inspector is available for a free 30-day evaluation at www.fluke.com/nettools. It costs \$695 for the main console and an agent license that covers up to 100 workstations.

© Fluke: (888) 493-5853

■ **Dell Computer Corp.** has introduced a new **workgroup server** that runs one or two 333-MHz, 350-MHz or 400-MHz Pentium II processors. The Power-Edge 2300 is a built-to-order server and supports up to 512M bytes of main memory and up to 54G bytes of internal storage. The server also features an Intel Corp. 100M bit/sec network interface card.

The one-processor model starts at \$3,166, while the two-processor version starts at \$11,157.

© Dell: (800) 388-8542

■ **Adaptec, Inc.** will soon launch its line of **DuraLAN Fast Ethernet server adapter cards**. The four full-duplex cards support autosensing 10/100M bit/sec ports, with an aggregate output of 200M bit/sec per port. The line includes one-port 32- and 64-bit cards as well as two- and four-port 64-bit cards. The cards cost from \$85 to \$695, depending on model, and will be available next month.

© Adaptec: (408) 945-8600



Fluke's Network Inspector

A dollop of Michael Dell — on servers and more



While Compaq Computer Corp. currently rules the server market, the company is facing a growing threat from Dell Computer Corp., which is led by one of the industry's best-known entrepreneurs, Michael Dell.

In this interview with *Network World* Editor in Chief John Gallant and Staff Writer Marc Songini, Dell discussed the differences in strategy between his namesake company and Compaq, Dell's future plans for the server market and the role of NT in enterprise applications. Dell also explained why he doesn't like the idea of thin clients and talked about why his company won't be following Compaq's lead in acquiring network companies.

What do you see as the key differences in your server strategy compared with companies such as, say, Compaq or IBM?

We changed the rules of the game in the server market by being the strongest proponent of the move toward an open architecture and by taking out some of the proprietary margin that existed in the server models. We redefined what the

customer was able to get at various points along the curve of price/performance.

While most of our effort has been in the entry-level and mid-range of the NT server space, in the second half of this year we are going to move from being a fast follower in technology to technology leadership with a focus on [greater] rack density, storage, clustering and performance. This is going to change what customers have to pay for this technology.

How far do you think NT and the Intel architecture can push up into the enterprise?

I don't have delusions of NT replacing all server platforms in a year or two. However, we're in a progression that is going to go on for the next five to seven years. As we get the [Intel/HP] Merced chip at the 64-bit address space, the opportunity to replace the high end of the minicomputer market and even some of the low-end of the traditional mainframe space certainly exists.

One of the other differences that highlights Dell in the server world is that we have a significant amount of our attention applied

to NT and are not putting a great deal of energy into other platforms. Our strategy is to go where the puck is going to be. We see NT as the primary growth engine. While it's not meeting

the leading maintenance and break/fix companies — Wang, Unisys, Decision One, these kinds of companies — and the leading outsourcing companies like EDS and Andersen Consulting. Our focus is to offer the customer choices. We don't see that bundling products and service is the right answer.

What's the secret of Dell's success in the server market?

We sell direct. This is a powerful economic force in computing. It's changing the way customers are buying. The primary benefit to the customer is that you are eliminating the reseller markup. The fact is that in new technology the cost of materials declines about 1% per



everyone's needs, NT is where the vast majority of the growth is.

Does the Compaq/Digital deal change your server strategy at all?

No, it doesn't. The questions we get around this relate to services. We have aligned with both

week. So if a competitor has 70 or 80 days of inventory and we have seven days of inventory, that's about 10 times more inventory, and a significant difference in the cost of that to the customer. There are a number of customers who are concerned about this

See Dell, page 29

Start-up to tackle Gigabit Ethernet testing



By Robin Schreier
Hohman
Las Vegas

The latest com-

pany to jump into the Gigabit Ethernet market isn't touting yet another switch or router. Rather, start-up IXIA Communications

will deliver a multiport traffic generator/analyzer that will check vendor claims about speeds, packet loss and latency.

And while potential customers might question relying on a start-up to fill such a need, IXIA has good bloodlines.

The company was funded by Jean-Claude Asscher, founder and chairman of Tekelec, a \$125 million maker of diagnostic and testing equipment. IXIA's president and founder is Errol Ginsberg, a testing equipment market veteran who has worked at both Tekelec and Netcom Systems, Inc.

IXIA this week will showcase its first product, the IXIA 1600, at NetWorld+Interop 98 here. The 16-slot chassis supports up to 32 Gigabit Ethernet ports, 64 ports

of 10/100M bit/sec or a combination. The test engine can generate any kind of Ethernet packet and watch the packet as it runs through the network, testing for packet size, cyclic redundancy check errors and other kinds of errors.

Using the IXIA 1600, users, vendors and test labs can stuff huge amounts of traffic through their networks to see exactly how they perform. The product comes with prewritten scripts, but users can create their own scripts as well.

IXIA has convinced a couple of high-profile switch start-ups — Extreme Networks and Foundry Networks, Inc. — to put their products on the line in live tests at Interop. The tests will take place at IXIA's booth and at the switch vendors' booths.

IXIA's major competition
See Gigabit, page 32

PROFILE: IXIA COMMUNICATIONS

Founded: 1997

Headquarters: Calabasas, Calif.

Primary product: IXIA1600, a multiport traffic generator/analyzer

Management: Errol Ginsberg, president; Gary Stone, director of sales; Joel Weissberger, director of hardware engineering; Jon Rager, chief financial officer

Employees: Under 20

Funding: Privately funded by Jean-Claude Asscher, founder and chairman of Tekelec

Competitor: Netcom

Fun fact: Ginsberg recently saw a mountain lion walking past a window at the company's suburban headquarters.

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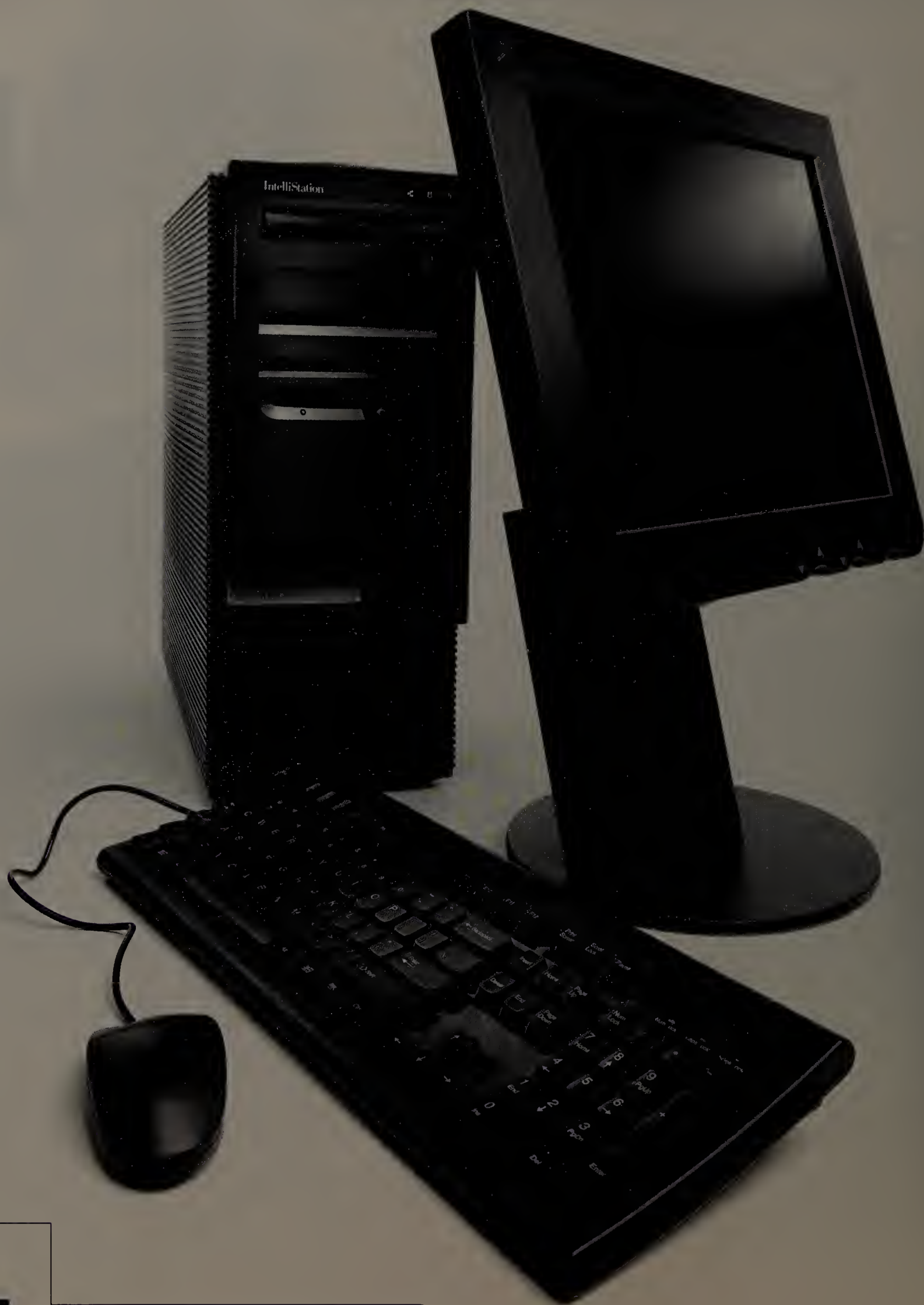
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Dell

Continued from page 20

dealer markup and inventory disadvantage. We've been able to penetrate our largest enterprise customers and acquire new accounts with a strong server platform.

Compaq has bought up a number of network companies and has tried to make the case for buying both servers and network components from one company. Do you see that as a valid strategy?

There are components of networking that are tied to the server. The obvious ones are the things that go in the box, the network adapters and that sort of thing. You could make a case that things attached to the server could be easily sold. But Compaq has to convince the reseller to sell the Compaq server and the Compaq router or the Compaq switch, rather than the Cisco or 3Com or Bay Networks product. That's not easy. Larger network users have bought into architectures. For somebody to switch them, there's going to have to be a pretty compelling argument presented. I'm not sure it has been.

You've said Dell would be committing something like a quarter of a billion dollars to R&D.

It's a little more than that this year, but that's about right.

Where will that money be deployed? What types of technology will Dell be improving or creating?

It's pretty broad. We're working in clustering, the storage area, mobile computing and desktop computing. We've got lots of effort going into systems management. And not all of the innovations here come in silicon or motherboards or video chips or things like that. We have created this whole built-to-order process and have a significant intellectual property portfolio and development effort around that.

Can you clarify Dell's stance on thin clients?

We see the network computer as counter to the whole move to Windows NT. So for the NC to take off, the trend toward NT has to stop and reverse itself, which we don't see happening. The other problem with the NC is that it doesn't have any support in an unconnected fashion. So if I take those users that are going to NT and those users who require mobile computing out of the equation, we're talking about a very small portion of the market.

Is there a thin-client model that you think is more interesting? Say, the Win-

dows-based terminal model?

What you're likely to see emerge is the best of both worlds—the managed client that takes away the users' ability to cause events that add cost to a company. The state of that machine would be stored on the server, so you've got a robust and redundant capability. But we're not promoting the NC architecture.

But do you promote the Windows-based terminal architecture? Would you offer products in that market?

Not particularly. It tends to have a fairly narrow appeal in medium-sized businesses.

What should network managers expect in a Merced/NT 5.0 world?

The first thing is they shouldn't expect it anytime real soon. But we've got an opportunity to take this whole open microprocessor computing architecture all the way through the minicomputer and up to the low-end of the mainframe architecture, and do it with an economic model that is more favorable for customers and provides more choice. ■

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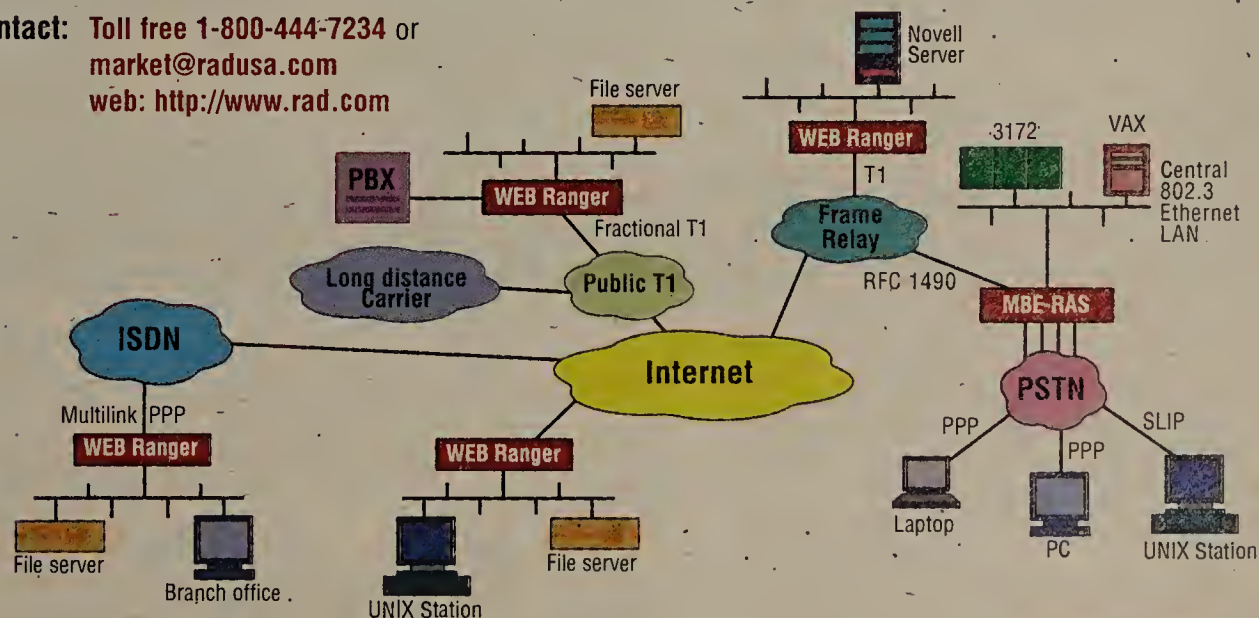


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Network Associates airs new sniffer suite

By Scott Lajoie
Santa Clara, Calif.

Network Associates, Inc. this week will add new capabilities to its portable Sniffer network analyzers.

The company's Sniffer Pro 1.5 can

watch over Gigabit Ethernet and high-speed serial interface environments. A user can also now analyze 100M bit/sec full-duplex Ethernet links from a single Sniffer console. Two Sniffers were needed in the past.

The new Sniffer also boasts an enhanced user interface that lets administrators see the network connection, net topology and problems all from one screen. In the past, users had to open a separate window to see each item.

Sniffer monitoring packages — which run on any Windows platform — are designed to help users manage internet networks and identify if problems are emanating from an application, WAN, LAN, router or bridge. Sniffers can pinpoint the cause of more than 200 problems on a net and can suggest fixes in a format that's easy to understand and implement.

With the new package, Network Associates is trying to cover all of its bases. According to surveys done by the company, more than 80% of deployed Sniffer products analyze two or more LAN or WAN topologies. Sniffer packages already support token-ring, FDDI and Ethernet LANs as well as frame relay and ATM WANs.

According to Paul Farr, director of product management, Network Associates also expects to add the new LAN/WAN features to a future version of the company's Distributed Sniffer System. DSS is Network Associates' enterprise software package for viewing multiple segments of a net from a single central console. The SnifferPro 1.5 suite starts at \$15,070.

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Sun bulks up its network server line

By Mary Lisbeth D'Amico
New York

Sun Microsystems, Inc. last week unveiled a new lineup of mid-range enterprise servers that the company claims incorporate mainframe-like features.

All of the machines incorporate dynamic reconfiguration and alternate pathing features that let the boxes re-route data around failures and provide quick data backup facilities in the event of a server outage.

Available immediately, the new 3500, 4500, 5500 and 6500 servers run Sun's Solaris operating system and use the 336-MHz UltraSPARC processor. The boxes can scale from one to 30 processors. They also feature the company's 84-MHz to 100-MHz Sun Gigaplane system bus.

The price for an entry-level Sun Enterprise 3500 system with two 250-MHz UltraSPARC-II CPUs, 256M bytes of memory, 9.1G bytes of disk space and a CD-ROM is \$49,700. The system scales to eight processors.

Sun also announced a family of super-computer-class systems, Sun HPC 3500, 4500, 5500 and 6500 servers, geared to customers running compute-intensive applications. The servers scale from one to 30 336-MHz UltraSPARC-II processors in a single SMP node, and up to 120 processors in a four-node cluster, Sun said. The entry-level HPC 3500 system configured with four 336-MHz UltraSPARC CPUs is \$85,400. Sun can be reached at (415) 786-7737.

D'Amico is a correspondent with IDG News Service's Munich bureau.



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ARINC gives flight to SNMP apps builder

NH

By Andy Eddy
Las Vegas

ARINC, Inc. this week will introduce Taboret, software that cuts the time and cost involved in

building SNMP applications.

ARINC, which has been around since 1929, is best known for its worldwide network that enables commercial aircraft to communicate with ground facilities and

each other. But the company also has a hand in the business of providing technical services to other companies.

Taboret, which will be on display here at NetWorld+Interop 98, is one product of

ARINC's technical services activities. According to the company, the software enables developers to build SNMP applications using drag-and-drop techniques rather than programming.

While ARINC primarily is targeting equipment manufacturers looking to enhance their products with SNMP applications, users could also employ the software to build custom management programs.

Taboret works by looking at the field labels within an SNMP-enabled network device's Management Information Base and dragging appropriate labels into the application being built. The resulting application taps fresh data and alarms from network devices' SNMP agents and displays the information for the net manager in various forms. ARINC provides a library of prebuilt "widgets" that integrate 3-D graphs, charts and spreadsheets into the application.

Separate applications don't need to be created for each operating system because the applications built by the Taboret editor are interpreted by an operating system-specific run-time engine. Run-time engines are available for Hewlett-Packard Co.'s OpenView on HP-UX, Solaris and Windows NT; IBM's NetView on AIX; and NT itself.

Acacia Networks, Inc., a Lowell, Mass., switch maker, previously had farmed out the creation of an OpenView-based monitoring application for Acacia's Gigabit Ethernet NovaSwitch. The application cost Acacia about \$150,000 and took months to complete. When Acacia needed to create the same application for another operating system, the company developed the application in-house with Taboret, which took one engineer between six and eight weeks to complete at an estimated cost of \$20,000.

The Taboret editor costs \$15,000 per developer seat and \$8,500 for each run-time engine.

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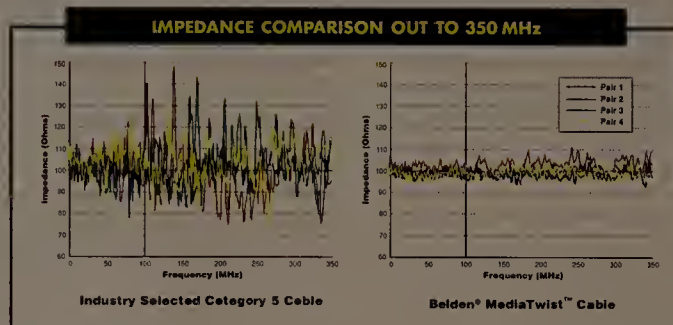
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Gigabit

Continued from page 20

appears to be Netcom. While IXIA is new, the company may have things going in its favor, said Rolf McClellan, founder of McClellan Consulting, in Harvard, Mass.

For instance, the IXIA 1600 can be configured with more ports than Netcom's comparable product, the SmartBits 2000. Netcom's offering supports 10 Gigabit Ethernet ports or 20 10/100M bit/sec ports per chassis.

McClellan also said IXIA's product is solid in that it can test Gigabit Ethernet packetspeed in minute detail.

The IXIA 1600 starts at \$41,000 for a system configured with two Gigabit Ethernet ports and eight 10/100M ports. IXIA is also considering leasing its test devices to companies that need the products for just a short time, for tasks such as evaluating new gear.

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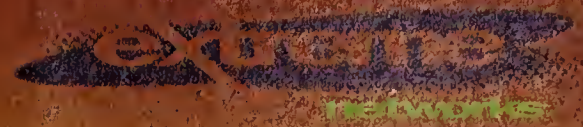
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The problem with certification

When you read this column, many of you will be in Las Vegas attending spring NetWorld+Interop 98, and I'll be there too. (At 3:15 p.m. on Tuesday you can watch Mark Gibbs and I continue our debate about Microsoft and the U.S. Department of Justice on Interop TV.)

I, on the other hand, am writing this column at The Waterside Publishing con-

ference, an annual gathering of writers, editors and publishers in the computer book business.

What connects these two events in my mind are some thoughts that occurred to me while listening to a presentation by Keith Weiskamp, CEO and publisher of the Coriolis Group, which publishes the "Exam Prep" and "Exam Cram" series of

books for some of the Microsoft certification programs — Microsoft Certified Systems Engineer (MCSE) and Microsoft Office User Specialist (MSOUS).

There I was among a group of people who publish the certification guides knowing I'd soon be in Las Vegas with the people who use them.

My first thought was there are so many certification programs out there that a dedicated person could spend years taking tests, all in the hopes of receiving a piece of paper designating them as a certified geek. They do this because, according to Weiskamp, that piece of paper is worth thousands of dollars in additional salary.

That led to my next thought — why would a company spend many thousands of dollars to have employees certified? It's not that the employees will learn, for example, how to network using TCP/IP. No, the employees will learn how to pass the MCSE TCP/IP test, which will help them get better jobs — probably with a different company.

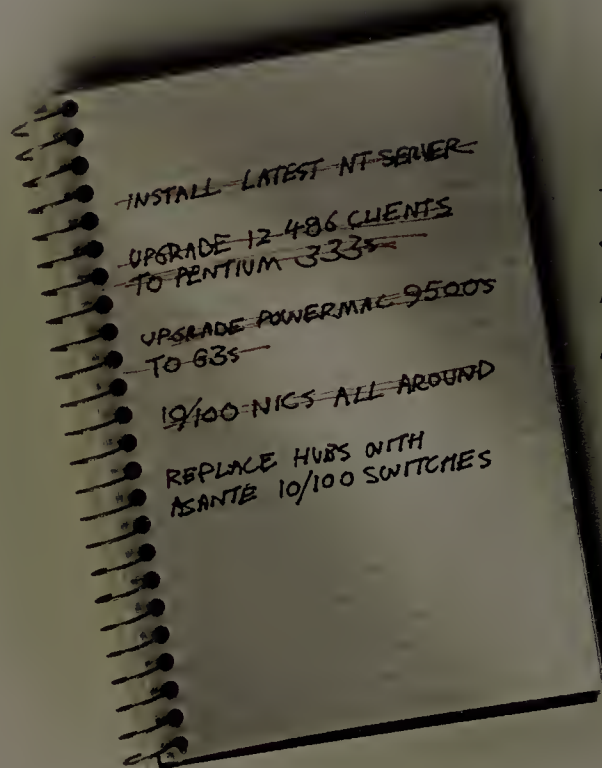
That led to my final thought — why does a company hire someone with an MCSE in TCP/IP rather than someone with three years' experience running an IP network? The answer is, of course, that the company doesn't have anyone on staff who understands IP, so there's no one who can interview applicants and tell if they have the requisite knowledge to do the job. There's no one to judge certified candidates either, but (supposedly) the certificate shows that they are knowledgeable. Do you buy that?

I think I agree with Weiskamp who — trying to be humorous — suggested the whole certification thing is a scam. A scam by the vendors that are looking to sell more hardware and software. A scam by the publishers to sell more books. And a scam by the legion of certified professionals who can substitute a few hours of exam cramming for a few years of experience. And as long as you continue to hire based on certification rather than experience, you're a willing participant in the scam.

Kearns, a former network administrator, is a freelance writer and consultant in Austin, Texas. He can be reached at wired@uquill.com.



Dave Kearns



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Tip of the week

The popular press has been quick to label as racist the conclusions drawn by Vanderbilt University Professor Donna Hoffman that lower income black Americans are less likely to have Internet access than are whites of similar economic status. This overlooks important information contained within the paper Hoffman co-authored. Read the details for yourself at www2000.ogsm.vanderbilt.edu/paperlist.html and let me know what you think.

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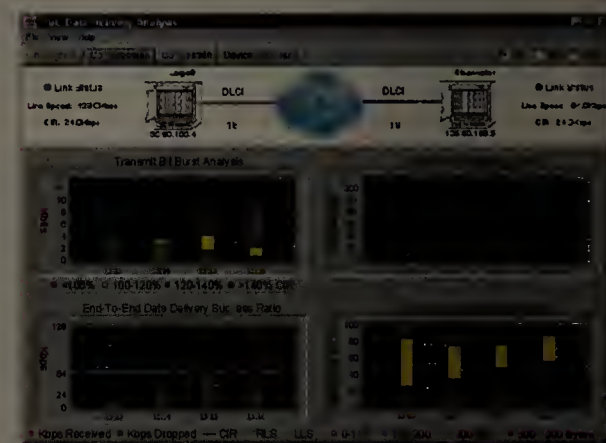
©1998 Compaq Computer Corporation. All rights reserved. Compaq registered U.S. Patent and Trademark Office. Windows NT is a registered trademark of Microsoft Corporation. All other brands and product names are trademarks or registered trademarks of their respective companies.The Compaq logo is displayed in a stylized, italicized font. The word "COMPAQ" is in a light color, possibly white or light grey, set against a dark, textured rectangular background that appears to be a deep red or maroon. The letters are bold and have a slight shadow or outline effect.

PARADYNE™

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With features so advanced,
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Standards-based RMON	✓
Identification of bandwidth hogs	✓
Non-disruptive PVC loopbacks	✓
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Rapid return to service	✓
Service level verification	✓

Your Frame Relay
network hog
used to be
anonymous.

Now it's Scott
in Marketing.

Can you build a SMART NETWORK with DUMB NICs?

Can network
interface cards
help you prioritize
net traffic, monitor
end-to-end
application
response times
and bust
bottlenecks?
Absolutely — if you
pick the right one.

You have to be pretty
smart to make it in the
networking business.

From one direction
come the unrelenting
demands of the business — bandwidth-sucking
applications, data/voice/multimedia conver-
gence, life-and-death QoS requirements, an ever-
growing number of nodes and an increasing
need for external connectivity. From the other
direction comes the technology assault, which
includes entirely new switching architectures,
an uncertain standards landscape and a whole
host of management headaches.

That's why a lot of network managers suffer
the symptoms of long-term sleep deprivation.
It's also the reason many of them give little
thought to their network interface cards.



And you can't really blame them. When you're trying to assess the potential impact of Layer 3 switching, gigabit Ethernet, VPNs and other innovations on your company's central nervous system, you might end up delegating NIC specification and purchasing to whoever is buying the PCs. Besides, some people believe that NICs have become commodity items. The only attributes they think distinguish one NIC from another are minor differences in performance, reliability and price.

But that's far from the truth.

The fact is that there can be *major* distinctions between NICs, especially when it comes to networking intelligence. And NIC intelligence can play a significant role in addressing some of the most important issues in networking today, including ■prioritizing traffic for different applications ■implementing end-to-end network service monitoring ■bypassing router bottlenecks ■effectively controlling multicast traffic and ■maximizing system availability.

Anyone who thinks that networking is only about what goes on at the core would do well to look at today's telephone and consider the added value that touch-tone dialing, "hold" buttons and caller ID displays provide. Analogous opportunities are now available in data networking, in the form of enhanced NIC functionality. So, while network managers and architects focus on the next generation of devices they want to implement on backbones and workgroup aggregation points, they shouldn't neglect the compelling technology options available for their end-nodes.

DYNAMICACCESS® SOFTWARE: 3COM'S INTELLIGENT NIC SOLUTION BUILT ON INDUSTRY STANDARDS

3Com has taken the lead in implementing high-value, NIC-resident intelligence that addresses many of the most critical issues in network computing. With DynamicAccess® software, network

architects can significantly increase performance, reliability and control of the enterprise IT environment — in conjunction with or even in lieu of major changes to other infrastructure components.

DynamicAccess® software is a key element of 3Com's TranscendWare software solution for intelligent networking. Because DynamicAccess® software is built on industry standards, the intelligence that DynamicAccess® software-enhanced NICs provide at network end-points (both clients and servers) offers tremendous value in a wide range of multivendor environments. DynamicAccess® software can easily be installed on 3Com and non-3Com NICs across the enterprise without having to touch individual PCs. And, as a NIC-based solution, it can provide sought-after

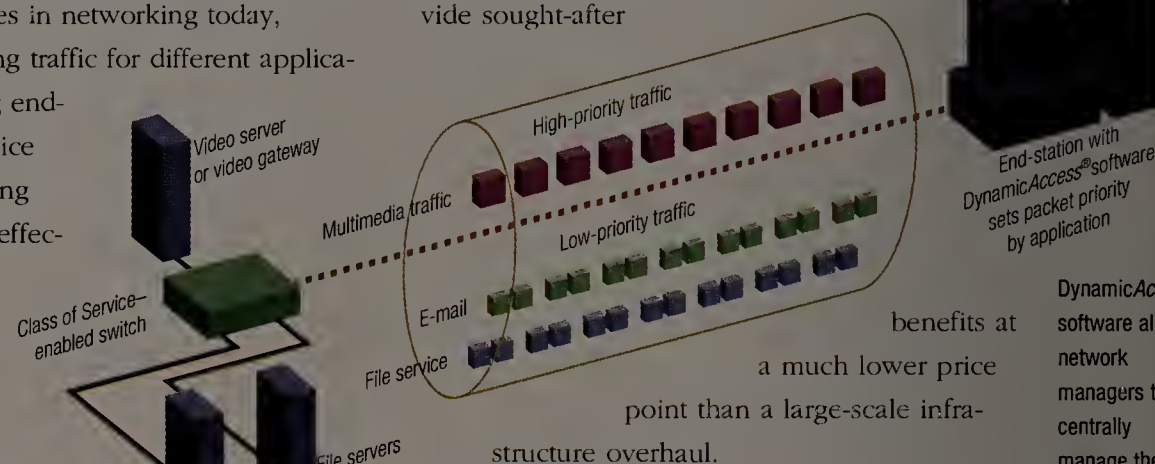


Figure 1

DynamicAccess® software is particularly useful in addressing four of today's primary networking issues: traffic prioritization, application response monitoring, router bottlenecks and multicast control.

A PRACTICAL APPROACH TO PRIORITIZING TRAFFIC

By adding networking intelligence to NICs, DynamicAccess® software provides a uniquely effective means for ensuring that traffic is appropriately prioritized. This prioritization is becoming an increasingly important issue as enterprise networks support a wider range of applications, some of which have critical response-time requirements, others of which do not. Instead of building sufficient overcapacity to make contention for bandwidth a nonissue, most organizations are seeking a solution that will allow them to give preference to certain applications.

DynamicAccess® software allows network managers to centrally manage the prioritization of network traffic without having to modify existing applications.

any kind are required to the router, which retains its role in the enforcement of filtering and firewall policies. Fast IP can also be tremendously helpful in "server farm" architectures where users consistently generate intersubnet traffic.

Fast IP is one of several 3Com solutions for speeding up intersubnet traffic. Network managers who are prepared to replace existing routers will most likely choose to implement Layer 3 switching in their revamped architectures. 3Com's leadership in Layer 3 switching is widely recognized, with standout solutions such as the CoreBuilder 3500 setting the pace for the industry. However, for network managers who want to improve network performance by minimizing router traffic while retaining the routers themselves, Fast IP offers a highly compelling, cost-effective solution that will continue to provide value even as organizations deploy the next generation of high-speed network technologies.

MULTICAST CONTROL WITH IEEE 802.1P

In addition to providing the prioritization controls described earlier, the IEEE 802.1p standard offers a way to avoid the potential flooding of networks by multicast traffic. This threat to network performance is likely to increase as organizations begin to implement multimedia applications, push technologies and other new point-to-multipoint services.

DynamicAccess® software uses IEEE 802.1p GARP Multicast Registration Protocol (GMRP) to address the multicast control issue by enabling a NIC to automatically control the multicast filters of the switch port to which it is attached. The NIC simply sends a message to the 802.1p-compliant switch, letting the switch know whether or not to forward traffic from a particular multicast group to that port.

This technique enables switch filters to be set dynamically based on desktop configurations, and it can be applied to all multicast traffic, not just IP multicast.

3Com also offers multicast control on many of its switches. The switch-based solution sets multicast filters that determine which groups of users receive multicast traffic. It is based on

Internet Group Management Protocol (IGMP) "snooping," under which switches can observe user-initiated requests for IP multicast services, such as a multimedia training session.

Based on those requests, the switch dynamically forwards multicast traffic only to those ports with participating users.

SERVER AND DESKTOP SYSTEMS BENEFIT, TOO

3Com NICs also feature value-added capabilities that boost the availability and reliability of the systems where they reside. One of these is support for Resilient Server Links (RSL), which is available on specialized models such as the Fast EtherLink Server NIC. RSL allows two NICs to be configured in a single server with one acting as the primary connection and the other as backup. Specialized driver software allows them to be treated as a single logical NIC.

The primary NIC continuously monitors the health of its network connection. If the link fails for any reason — whether it's caused by a problem with a switch, hub, cable or even the NIC itself — the software automatically transfers the MAC address and all connections to a backup NIC. The backup NIC broadcasts traffic information to network switches to inform them of the new path. Active sessions remain active, so users don't even know there has been a cutover.

This additional fault tolerance is obviously of tremendous value in today's pressurized business computing environments, where downtime carries substantial economic consequences. It is also a highly cost-effective technique, which complements other failover strategies very well.

3Com NICs can also be configured to better manage their PCs with such features as Remote Wake Up — which allows for after-hours admin-

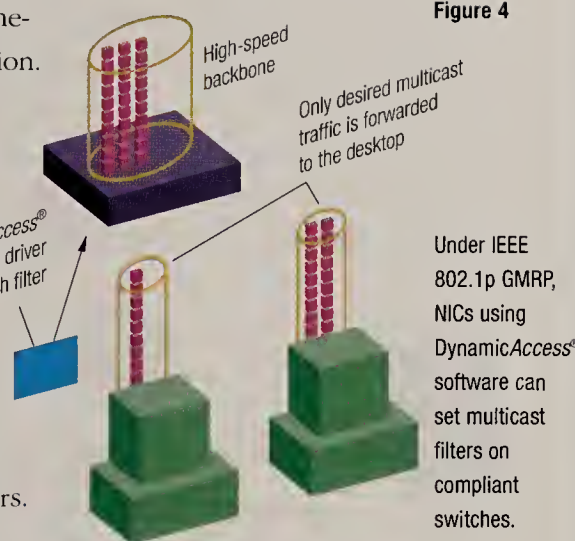


Figure 4

3Com's DynamicAccess® software suite accomplishes this key objective by setting bits in the packets it transmits to identify the particular priority level for each traffic flow.

DynamicAccess® software supports both IEEE 802.1p (which prioritizes Layer 2 traffic through switched networks) and the IETF-defined IP Type of Service (which provides for end-to-end prioritization across routers and the WAN). In addition, NICs running DynamicAccess® software identify traffic priority using 3Com's PACE technology — a prestandard technology that enables devices such as switches to recognize and provide higher priority for specified data streams.

There are several advantages to having the intelligence for priority controls running at the NIC level as provided for by 3Com's architecture. First, it allows for the provision of priority control independent of application development. Because DynamicAccess® software prioritizes traffic by matching port/socket ranges with specific applications and applying IS-defined priorities, applications don't have to be rewritten. Thus network managers, rather than application developers, get the final say on how applications will behave across the enterprise infrastructure.

Also, because the priority parameters at every NIC can be controlled centrally, the 3Com approach allows network managers to implement a wide range of prioritization policies based on application, subnet, MAC address and other parameters, delivering unprecedented control over how closely traffic management reflects business priorities.

Identifying priority at the NIC is an effective prioritization strategy for a wide range of networking environments. It can be applied across Layer 2 switching infrastructure where NICs at both the client and server are equipped with DynamicAccess® software. It's also applicable where only one end-point is equipped with DynamicAccess® software and an advanced device such as 3Com's advanced CoreBuilder™

3500 and 9000 switches — which can also identify and label traffic requiring priority treatment — are at the other end. And it's an extremely practical solution for setting IEEE 802.1p and/or IP Type of Service bits to ensure end-to-end prioritization across the WAN.

Simply put, the standards-based priority labeling that DynamicAccess® software delivers at the NIC is a very smart, flexible way to make sure that latency-sensitive applications aren't compromised as the volume and diversity of network traffic continues to increase.

RMON ON THE NIC: EXTENDING INDUSTRY-STANDARD RMON MANAGEMENT ACROSS THE NETWORK

In addition to providing practical traffic prioritization, 3Com's DynamicAccess® software also transforms NICs into full-time, nine-group RMON probes distributed across enterprise network end-points. 3Com will soon further enhance these monitoring facilities to include full RMON 2 support and tools for monitoring application response times across heterogeneous network infrastructure.

The value of having fully distributed RMON capabilities is obvious. First of all, it overcomes one of the biggest management limitations in switched networks. Most switches lack full RMON capabilities on each port. In a shared media environment, a single RMON probe was sufficient, since each port experienced identical traffic flows. But with the advent of switching, this is no longer the case, since each port is its own collision domain. In high-speed networks, the processing power and buffer memory necessary to capture and analyze packets have gone up, adding to the cost of putting complete RMON capability on every port. Switches thus

typically provide a "roving" analysis port and/or deliver only some of RMON's nine statistical groups. Even advanced switches such as 3Com's SuperStack® II 1100/3300 and CoreBuilder 3500 can benefit from the collection of full-time full RMON and RMON 2 from the desktop.

With RMON on the NIC, every port (and therefore every collision domain) gains a dedicated RMON probe. Since the NIC and its PC is already processing the packets involved, there is only a slight incremental load added to the desktop — something on the order of 2 to 3 percent.

Not only does this innovative approach make RMON data available from every end-point on the enterprise network, it also makes captured packets available for further analysis. So instead of having to travel out to a remote office hundreds of miles away, network technicians can simply transmit captured packets over the network and run them through their protocol analysis tool of choice. That significantly boosts the productivity of network technical staff and helps speed the diagnosis of communications problems.

3Com's distributed RMON solution also provides an effective method of collecting RMON data from network end-points to meet the particular needs of the technical staff. 3Com's Transcend dRMON Edge Monitor aggregates RMON data and presents it to any RMON management application, such as 3Com's Transcend LANsentry Manager.

Armed with immediate access to detailed network analysis data from anywhere across the enterprise, network technicians and architects can make smarter decisions about immediate and long-term networking challenges. The result? Improved performance, faster troubleshooting and reduced management costs.

BYPASSING ROUTER BOTTLENECKS WITH FAST IP

New corporate intranets introduce new traffic flows, increasing the proportion of intersubnet traffic. And with faster networking technologies, those subnets are now aggregating more and more bandwidth. As a result, routers are being asked to handle greater loads — and are becoming a significant bottleneck in the process.

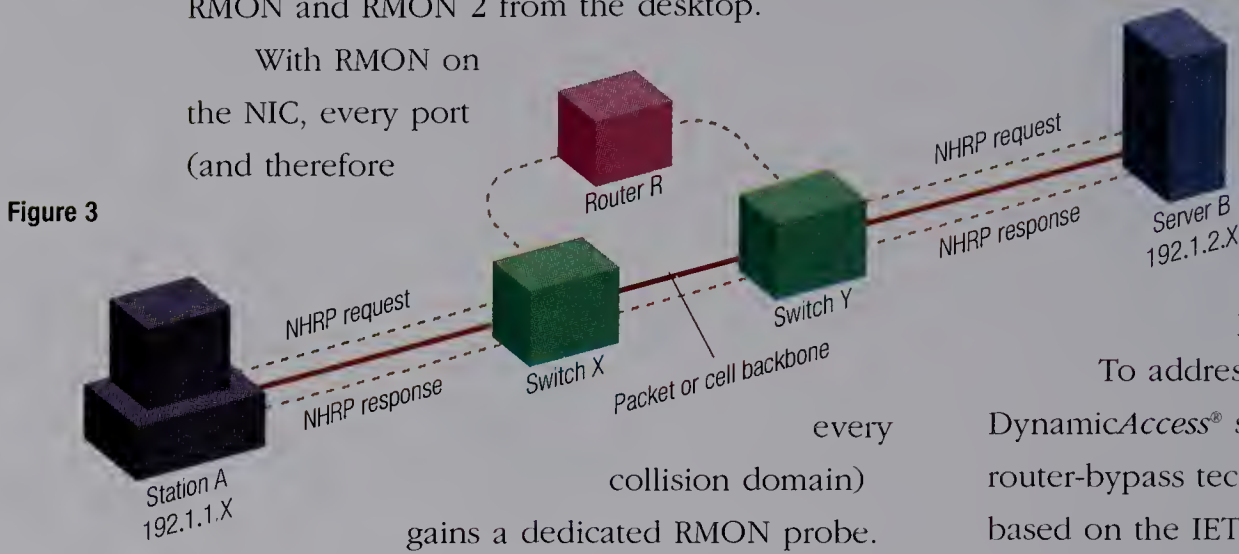
To address this growing concern, 3Com's DynamicAccess® software offers an innovative router-bypass technology called Fast IP. Fast IP is based on the IETF draft standard Next Hop Resolution Protocol (NHRP), and it can be implemented across the full range of network technologies. Fast IP also works in conjunction with current and emerging LAN standards such as IEEE 802.1Q for VLANs and ATM ELANs to provide efficient transfer of unicast data between subnets.

Fast IP is based on a request-response process between end-systems. (See fig. 1). Station A issues a Fast IP "shortcut" request — which contains Station A's MAC address and, where available, its VLAN ID — to Server B. This request goes through the router just like any other intersubnet communication, allowing the router to apply normal filtering and security policies to it. If the router allows the packet to go through, Server B issues a Fast IP response.

That response will indicate that there is a switched connection available between the two subnets where Station A and Server B reside. The two end-systems will therefore redirect data packets directly to each other using their respective MAC addresses, rather than going through the router, resulting in wire-speed switching. If there is no response to the Fast IP request, packets will travel through the default router gateway as usual.

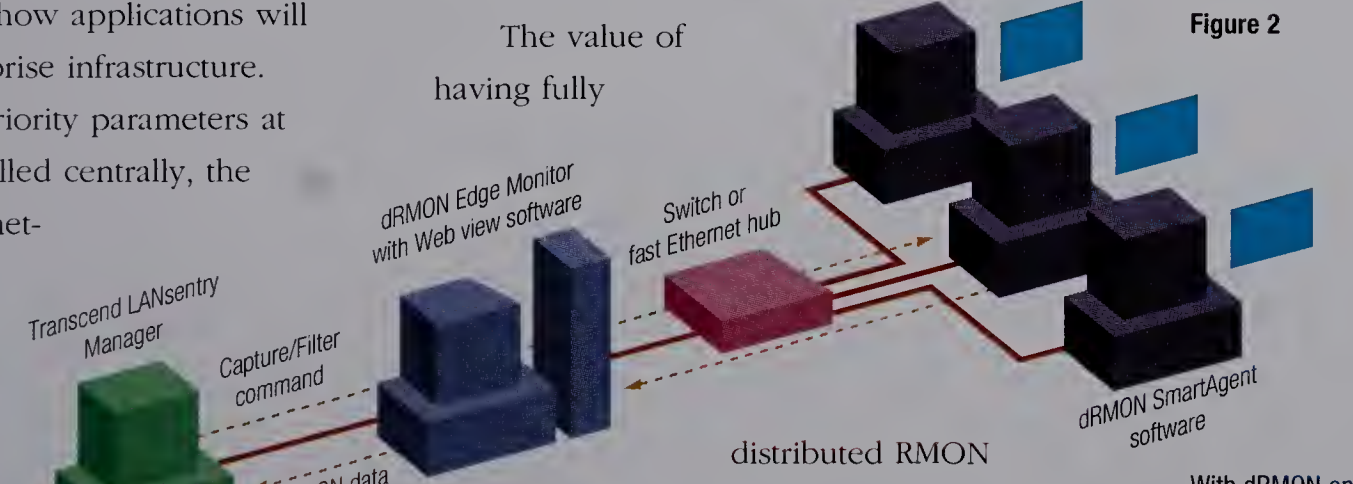
Fast IP can be particularly appealing for network architects who have routers in place now and want to "front-end" them with low-cost, high-speed Layer 2 switches without engaging in a major IP addressing overhaul. With Fast IP, no changes of

Figure 3



Fast IP uses NHRP-based request-and-response to bypass router bottlenecks after establishing a switched path between end-stations.

Figure 2



With dRMON on desktop and server NICs, network managers can get vital information on any network anywhere in the world — simply and cost-effectively.

istration of desktop machines across the enterprise — and DMI 2.0 support. 3Com's Managed PC Boot Agent also enhances corporate desktops with "PreOS" booting, enabling managers to remotely and automatically execute system software installations on new PCs, perform network-wide OS upgrades, repair damaged desktop configurations and accelerate disaster recovery.

PLAN OF ACTION

Given that NIC intelligence clearly offers so many ways to increase the performance and manageability of enterprise computing infrastructures, network managers and planners should consider several possible actions to ensure that they take full advantage of the potential benefits available to them. These actions include:

Working with systems procurement staff to evaluate purchasing options

In many organizations, NIC purchases are made as part of a desktop or server systems buy. The systems purchasing staff may get some baseline spec from the networking group (such as the need for 100 Mbs throughput or a "short list" of brand names) but are otherwise free to seek out the best "deal" on a volume systems purchase, which is often contingent upon many other factors, such as processing power, financial terms and service contracts. In this type of purchasing scenario, the potential differences in NIC features and functionality can easily be overlooked or minimized. Corporate networking teams interested in obtaining the full benefits of intelligent NICs may therefore want to alert systems purchasing staff to new developments in the NIC market and become more emphatic in specifying and evaluating NIC features.

Making implementation decisions based on asset life-cycles

Technology implementation decisions aren't made in a vacuum. Budget constraints, competing or conflicting business demands and demonstrable ROI all come into play when purchases and projects have to be approved. IT departments that have recently made relatively significant investments in network infrastructure may find it difficult to make a strong economic argu-

ment for spending more money on additional upgrades to the switching/routing architecture. But if a new cycle of desktop and server purchasing is coming up, network managers can piggyback on that life-cycle shift to obtain the next-generation intelligent NICs that can address pressing issues such as router bottlenecks and quality of service controls.

Seriously evaluate new NIC-based technologies

This white paper has briefly outlined the features and benefits of DynamicAccess® software and other key capabilities of 3Com's intelligent NICs. Network architects and technicians are invited to further investigate these technologies by contacting their 3Com account representative or by browsing the 3Com Web site for further technical information, as well as by implementing 3Com DynamicAccess® technology in network test beds and/or pilot projects. 3Com has made DynamicAccess® software extremely easy to install, manage and evaluate. It is available via the Web and can be distributed using popular tools such as Microsoft SMS, Intel LANDesk Manager and Novell ManageWise.

3Com has long been committed to delivering innovative, standards-compliant solutions for ensuring that enterprise networks can meet the rapidly changing demands of the business. As those demands continue to escalate, network managers must seek new ways of engineering the performance, reliability and control they need into the enterprise infrastructure. The use of intelligent NICs offers a unique and timely opportunity to achieve major improvements in the behavior and operation of the network — without overhauling the switching/routing fabric. The fact is that NICs really can make a difference. You just have to be smart enough to see how.

For an information kit with the full story on Layer 3 switching, scalable stackables, and intelligent NICs — plus a free interactive CD ROM demo, please contact us at

Phone: 888-906-3Com Ext. 217

World Wide Web:
<http://www.3com.com/smartnics>

Produced by Data Communications Magazine.
April 21, 1998

Internetworks

Covering: TCP/IP • SNA • Network Management
Muxes, Routers and WAN switches • Remote Access

Briefs

Netaccess, Inc. this week will use NetWorld+ Interop 98 to introduce IRAS-24A, a PCI card that can convert Windows NT servers into dial-up remote access servers.

IRAS-24A supports 24 simultaneous ISDN Basic Rate Interface or analog modem calls. It supports 56K bit/sec standard modems as well as all standard slower modems, and is priced at \$5,999.

© Netaccess: (603) 898-1800

Ganymede Software, Inc. last week announced that its Pegasus end-to-end network response time monitoring tool now supports machines running SCO UnixWare, Silicon Graphics' IRIX and Solaris x86.

That brings the number of operating systems supported by the management tool to a total of 15.

Pegasus includes Network Performance Endpoint software that runs on these operating systems and reports on network performance.

Pegasus is designed to give net managers an end user's view of network performance and to alert net managers of impending problems before end users are affected.

Network Performance Endpoint software costs \$4,000 per operating system and can run on an unlimited number of machines.

© Ganymede: (919) 469-0997

Digi International, Inc. this week will introduce the DataFire RAS and AccelePort RAS PCI remote access cards at NetWorld+ Interop 98.

The cards feature both ISDN and analog modem support for up to 60 ports per PCI card. Both cards support Windows NT, NetWare and Unix. The first products in the Digi RAS family will be available by the end of the third quarter. Pricing information was not available.

© Digi: (800) 344-4273

Lucent buys ATM specialist Yurie for \$1 billion

Acquisition gives Lucent ability to add ATM access features to switches.

By Tim Greene and Torsten Busse
Murray Hill, N.J.

Lucent Technologies, Inc.'s data networking executives went shopping again last week, this time returning home with the \$1 billion purchase of ATM access switch vendor Yurie Systems, Inc.

The buy gives Lucent greater access to Yurie's hot ATM access and concentration devices and will likely let Lucent more easily add the technology to its own switches.

Lucent is already selling Yurie's LDR family of products under an OEM agreement as the Lucent Access Concentrator 120 and Lucent Access Concentrator 60. The OEM sales accounted for less than 10% of Yurie's OEM business last year, said Jeong Kim, chairman and CEO of Yurie.

Kim will join Lucent as president of Carrier Networks

within the company's Data Networking Systems group. Yurie will remain headquartered in Landover, Md.

In addition to Lucent, Yurie has private-label agreements with Bay Networks, Inc. and Ericsson, Inc. Lucent is expected to keep up the agreement with Bay, but that is less likely with Ericsson, which is a direct competitor with Lucent for carrier switching business. Ericsson could try to strike up a deal with Yurie competitors Larscom, Inc., ADC Kentrox or 3Com Corp.

Lucent last fall said it wanted to become a serious player in the data network market, and over the past six months the company has been busy building up its product portfolio through several acquisitions.

For example, in January, Lucent acquired Gigabit Ethernet switch maker Prominet

Corp., and in December, the company bought remote access product maker Livingston Enterprises, Inc.

Still, the \$1 billion purchase price raised some industry eyebrows because Yurie is projected to do only about \$80 million in business this year and had revenue of \$51.1 million in 1997.

"They are early to market with leadership products in a market that's about to explode," said Bill O'Shea, president of Lucent's Data Networking Systems group. Yurie's revenue is sure to increase, he added.

In the numbers

Indeed, Dataquest, Inc. research shows a compound annual growth rate of 58% for the WAN ATM access market, which is set to grow from \$205 million in 1997 to \$1.8 billion in 2001.

In addition, Dataquest predicts the market for high-speed

PROFILE: YURIE SYSTEMS, INC.

Founded: February 1992

Headquarters: Landover, Md.

1997 revenue: \$51.1 million

Management: Jeong Kim, chairman and CEO, previously with Allied Signal

Employees: 240

Products: The LDR family of ATM access, concentrator and multiplexer devices

ATM concentrators — those supporting up to OC-3 speeds — will grow from \$65 million in 1996 to \$1.1 billion in 2001, a compound annual growth rate of 57%.

The phenomenal price also indicates Lucent's optimism that corporate users are interested in ATM wide-area services.

"The reason the frame relay market has taken off is that it was easier to implement than ATM. But with this [Yurie] type of box, you can drop it in your existing network and make use of ATM," said Rosemary Cochran, an analyst with Vertical Systems Group in Dedham, Mass.

Good move

"It's a great purchase," said George Hunt, director and principal WAN equipment analyst at Dataquest. "Yurie is the premier ATM access vendor, the first one to ship a commercial ATM access concentrator, which now has the largest installed base."

Yurie's access concentrators take in a variety of traffic — LAN, frame relay and ATM — and blend it all onto one ATM pipe. Yurie sells products that can feed links as large as OC-3 at 155M bit/sec or as small as a T-1 at 1.54M bit/sec.

The Yurie concentrator also supports T-1 speed interfaces for frame relay and ATM as well as traditional time-division multiplexed traffic.

According to spokesmen for Yurie, ATM concentration fits into the networks of Lucent's big accounts, including the regional

See Yurie, page 44

IBM bulks up its Nways backbone switch

By Marc Songini
Raleigh, N.C.

IBM last week boosted the network management features of its big backbone switch.

IBM is hoping the enhancements for its 2220 Nways Broadband Switch will help users better control congestion and performance in large corporate frame relay and ATM backbones.

Also, the enhancements should help IBM compete more effectively with other backbone switches, including Nortel's Passport, Cisco Systems, Inc.'s Stratacom and Newbridge Network, Inc.'s high-end boxes.

The 2220 supports integrated voice, video, data and image networks. The 2220 runs IBM's Network Broadband Services software, which manages everything the switch does, from bandwidth management to congestion control. IBM is aiming the 2220 at

corporate frame relay and ATM users and also at the ISP market.

The 2220's new features include the following:

- The ability to split single physical ATM lines into several logical trunks, saving users on ATM line costs.

- The capability to notify downstream devices, such as smaller switches or frame relay access devices, that there is congestion on the network. The idea is to reduce the amount of traffic those devices would resend in the event of congestion.

- For backup, an enhancement that will let users run frame



The enhanced 2220 offers greater management power, QoS guarantees and congestion control in the network, IBM says.

high-priority messages.

The enhanced 2220 will be available in July, starting at \$60,000.

© IBM: (800) 426-3333

Start-up launches Java-based mgmt. system

NH

By Jim Duffy

Santa Clara, Calif.

Start-up Manage.Com believes it has a better way of managing intranets using the World

Wide Web.

The company is the latest in a series of Web-based management newcomers following in the tracks of NextPoint Networks, Inc. and Proactive Networks (NW,

April 13, page 23). And like its predecessors, Manage.Com thinks the best way to manage networks based on Internet technologies is to use Internet technologies.

But Manage.Com claims its FrontLine

Manager offering is different — something customers will get to see for themselves this week at NetWorld+Interop 98.

The Manage.Com product handles day-to-day operational management tasks, such as responding immediately to alerts, rather than “back-end” management, such as device reconfiguration and establishing security policies.

The product consists of a Web interface, a management server that runs on Windows NT or Solaris, and Java-based management agents.

The graphical user interface, which initially runs on Microsoft Corp.’s Internet Explorer, provides views of applications, network services, servers, desktops and other devices such as hubs and switches. The server supports an object database that dynamically represents network status and device relationships. The agents, which can run on any managed device that supports a Java Virtual Machine, provide dynamic resource status monitoring and are easily upgradable.

FrontLine Manager also supports standard SNMP agents and proprietary Management Information Bases from 3Com Corp., Bay Networks, Inc., Cisco Systems, Inc. and Cabletron Systems, Inc. A single copy of FrontLine Manager supports 255 managed devices.

Taking full advantage

Users said FrontLine Manager shows promise but customers will have to reinstrument their networks with Manage.Com’s Java agents to take full advantage of the Manage.Com product. Users also said vendor-specific tools will still be needed to handle more sophisticated management tasks.

“[FrontLine Manager] will make sure [Domain Name Service] is running, make sure your local routers are running and check the throughput on the line,” said Tom Reinsel, managing partner and principal architect at Pepperweed Consulting, in Chicago. “At this point, it’s a surface scratch. Getting deeper down into what’s really going on in the network . . . that needs to evolve.”

Manage.Com’s software costs \$2,995. It will ship May 31.

Manage.Com was founded in 1995, initially as a consulting firm. Company founder and CEO Jay Parekh previously was senior engineering manager at Bay and was involved in managing product development for the Optivity management product. Manage.Com received \$3.5 million in venture capital funding about a year ago from U.S. Venture Partners, of Menlo Park, Calif.

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● A look at other Web-based management efforts

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Cisco rolls out high-end campus switch

By Network World staff

Cisco Systems, Inc. last week announced the Catalyst 8500 family of modular campus switch routers, the long-awaited gigabit-speed boxes for large

campus backbones.

The 8500 line includes the modular 8510, a 10G bit/sec five-slot switch router, and the 8540, a 40G bit/sec 13-slot switch router (NW, March 16, page 4). Both run

Cisco's IOS software and are intended primarily for campus backbones that run IP and IPX and require high densities of Fast Ethernet or Gigabit Ethernet ports.

The "8500 is Cisco's answer, finally, to

Layer 3 switching," said Nick Lippis, president of Strategic Networks, a consultancy in Rockland, Mass. Cisco's previous Layer 3 products were below what the industry is accepting in terms of performance, he said.

With the 8500, "Cisco has been able to get the performance numbers up while keeping latency really low," Lippis said.

The 8510 reportedly provides aggregate throughput of 6 million packet/sec for both Layer 2 and Layer 3 switching and supports up to 32 fully routed and switched 10/100M bit/sec ports and up to four Gigabit Ethernet ports.

The 8540 has a 40G bit/sec switching fabric and aggregate throughput of 24 million packet/sec, supporting up to 128 fully routed 10/100M bit/sec ports or 16 routed Gigabit Ethernet ports.

Besides IP and IPX, the devices support IP multicast, bridged traffic and many other protocols, including IGMP, GGP and DHCP.

The IPX support is a key product differentiator, Lippis said. "Everyone else has very fast IP performance. No one has fast IPX performance."

Lippis said the 8500 ultimately will replace Cisco 7500 routers in campus backbones. "You'll see the 8540 being positioned to replace 7500s supporting FDDI backbones that connect campuses together."

Pricing for the 8500 starts at \$24,995 and scales up. Per-port pricing ranges from \$700 to \$2,000.

Two of the new components for the 8500 line — the Catalyst Switch Route Processor (SRP) and an eight-port Fast Ethernet routing module — can also be used in the lower slots of the Catalyst 5500 LAN switches. The SRP is capable of routing IP and IPX traffic at six million packet/sec and runs IOS.

Other new modules announced for the 5500 line include the 24-port 10/100 Fast EtherChannel switching module and the 12-port 100BaseFX Fast EtherChannel module.

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Yurie

Continued from page 41

Bell operating companies, and in the long-distance networks of AT&T and others. Lucent wants to sell IP services that ride over ATM backbones, and Yurie boxes enable Lucent to do that, analysts said.

Under the terms of the agreement approved by the boards of both Lucent and Yurie, Lucent will begin a cash tender offer for all outstanding shares of Yurie common stock for \$35 per share. The offer is expected to commence no later than April 30 and will be scheduled to close by May 28.

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Busse is the San Francisco bureau chief for the IDG News Service.



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3Com boosts WAN switch family

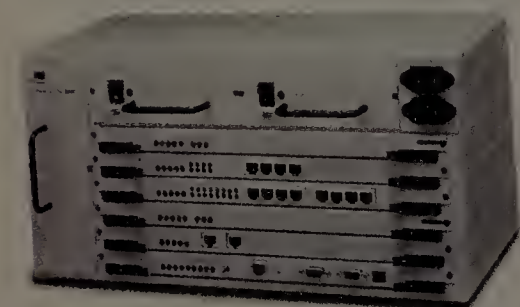
By Robin Schreier Hohman
Santa Clara, Calif.

3Com Corp. has announced a slew of new WAN switches and access products — dubbed the PathBuilder family — that are designed to help customers extend their managed voice, video and data networks beyond the LAN.

In addition, 3Com has enhanced its NetBuilder routers with software designed to let companies send traffic over the Internet securely.

The offerings address the biggest weakness in 3Com's end-to-end network equipment strategy — a lack of strong WAN products.

"One of the problems 3Com has had on the WAN switch side of the business is that the CoreBuilders were mostly designed to terminate LANs . . . they weren't designed from the ground up to be WAN [switches]," said Ray Keneipp,



3Com's PathBuilder S600 WAN access switch offers an easy-to-use, embedded, menu-driven management interface.

principal analyst for carrier infrastructures at consulting firm Current Analysis.

The top-of-the-line device in 3Com's new product family is the PathBuilder S36170 WAN Switch. The carrier-class ATM switch, being resold under an OEM agreement with Newbridge Networks, Inc., boasts a nonblocking switch platform that scales from 1.6G bit/sec to 12.8G bit/sec — enough power for a large enterprise or a carrier.

The switch features a host of WAN interfaces, including T-1, T-3, channelized and unchannelized frame relay, and OC-12. Pricing for the switch starts at \$50,000.

The PathBuilder line also includes the following:

- The SuperStackII PathBuilder S310 and S330 Access Switches (formerly called the SuperStack II AccessBuilder 9100 and 9300 ATM WAN Access Switches). The fixed configuration switches, for mid-size branch offices, include added voice and video routing capabilities. The switches feature inverse T-1 multiplexing for access to ATM wide-area links and 10Base-T connections on the LAN side. The switches start at \$6,000.

- The PathBuilder S600 WAN access switch. This six-slot chassis is an enhanced AccessBuilder 9600 switch with additional switching, voice and video capabilities. Prices start at \$15,000.

- The PathBuilder S700 WAN switch, an 18-slot chassis with a switching capacity

of up to 3.2G bit/sec, starts at about \$35,000.

Analysts said 3Com with its PathBuilder line has taken a path similar to that of Cisco Systems, Inc. and FORE Sys-

tems, Inc. by basing its WAN products on ATM technology. However, 3Com's offerings provide connectivity to networks based on frame relay, IP and other popular technologies.

The PathBuilder products are all compliant with IEEE voice and video standards, including G.711 and G.729 voice compression and H.320 and H.323 for

video. According to the Current Analysis report, these features will be important in the future as 3Com rolls out voice over IP and voice over frame relay technologies on its WAN devices in the second half of the year.

The PathBuilder switches will be available starting next month.

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The Internet

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Billions are being spent to provide information access via enterprise networks. But access can be a Pandora's Box, so many more millions will need to be spent by corporations just to prevent unauthorized access.



Toshiba's **Network CryptoGate (NCG)** solves a problem common to Virtual Private Network systems — security compromised by remote users. NCG permits secure access from any remote terminal, anywhere, anytime. And the client-installed software is completely transparent to the user. The system uses only open software standards and is entirely modular, so it can be expanded to protect any size enterprise.

ISDN Power Plug-Ins. The TR Series Routers.

Launched late in 1997, the TR-602 Compact Router now shares the SOHO spotlight with the new **TR-653 Compact Router**. In addition to ISDN speed and a built-in 4-port hub, it boasts full telephone and fax connectivity. It's a high-speed access solution anyone can afford.

INTERNETWORKING MONITOR

When switches don't stack up

Of the many factors that have helped drive down the price of Ethernet switch ports, the introduction of stackable communications boxes is among the most

important. Recent work at The Tolly Group's lab has uncovered several areas in which stackables may fall short.

Stackable switches of any topology typi-

cally have three significant issues with which to deal. And to make matters worse, all three issues become bigger problems at higher speeds. What is a minor issue to an Ethernet switch becomes a potential showstopper on a Fast Ethernet switch.

The first problem is one of inadequate switch-to-switch bandwidth. While, say, a single 100M bit/sec uplink between two

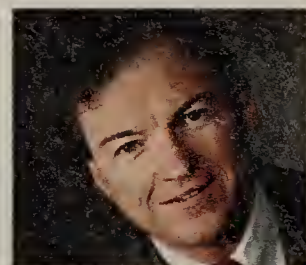
10M bit/sec Ethernet workgroup switches might suffice, it clearly doesn't do the job if those switches are operating at 10/100M bit/sec. Thus, effectively extending the backplane between switches to allow for nonblocking communication becomes a primary issue.

To solve the first problem, vendors typically trunk Fast Ethernet ports together — forming one or more high-speed trunks — to be used between switches. But this solution creates the second problem: overconsumption of ports.

This is a zero-sum game. For every 100M bit/sec you add to the interswitch capacity, you lose a 100M bit/sec user port. Of a 24-port Fast Ethernet switch, how many do you dedicate to the interswitch link? Decide on a four-link trunk and you could have 2G bit/sec worth of user traffic aimed at a 400M bit/sec trunk.

Even devoting eight ports to interswitch traffic leaves you potentially oversubscribed by a factor of two.

The cost equation for user ports is the second problem. When you end up getting only 16 usable ports from a 24-port



Kevin Tolly

switch, the price of the switch doesn't go down. What happens, in effect, is that each user port will cost you more. And having only two-thirds of the ports available for users will likely increase the number of switches you'll need to purchase.

So most network managers will have to live with a potentially oversubscribed link between stackable switches. Given that most of the time there will be some local traffic or some ports will be inactive, interswitch congestion is not likely to be a constant problem. But what happens when performance problems occur?

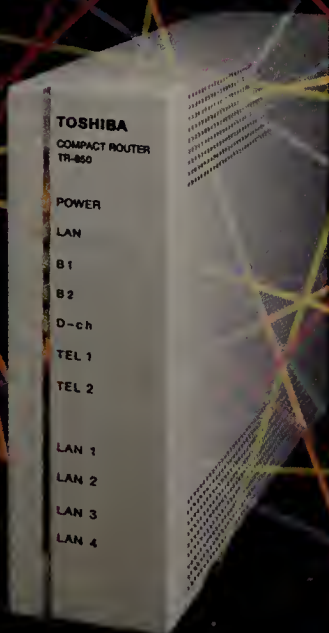
That creates the third problem — erratic response to congestion. Ideally, an internetwork device should offer a controlled response to any congestion situation. Perhaps certain ports or traffic streams would receive priority access to the limited interswitch bandwidth. Or, worst case, all streams would suffer equally, and there would be a general slowdown on sessions traversing the congested link.

Unfortunately, the hoped-for graceful degradation does not always occur. Tests show that often random discard is the order of the day. This, of course, would wreak havoc on the session traffic.

Fortunately, some vendors are well aware of these issues. Soon, some next-generation stackables will eliminate or at least mitigate some of these problems. In the meantime, network managers would do well to evaluate their current exposure to these kinds of problems.

Tolly is president of The Tolly Group, a strategic consulting and independent testing firm in Manasquan, N.J. He can be reached at (732) 528-3300, ktolly@tolly.com or www.tolly.com.

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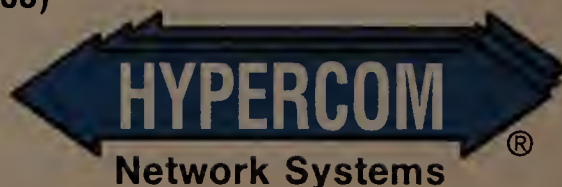
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Thin-Client/Server Computing

Reducing the costs and complexities of application deployment, management, access and use.



“A thin-client/server approach equipped us with a unique way of entering large amounts of data into a Windows-based system without having to upgrade the existing communications infrastructure. There have also been significant savings in running the application using a network-centric PC-based technology, provided by a Citrix solution, as opposed to two different mainframe systems.”

**Marc Maertens,
Honeywell Europe S.A.**

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Thin-Client/Server Computing Takes Your Enterprise Further



When *Fortune* magazine recently named the "10 Tech Trends To Bet On," its number-one pick was centralized

computing. But as you centralize, the question remains: What is the most efficient and cost-effective way to get there? Is there an existing technology that will do the job? Or will you have to wait for something new—and untested?

The solution that more and more companies are turning to is thin-client/server computing. It's available today. And it's from Citrix Systems, Inc.

is not about devices or operating systems. It works with everything from the latest Pentium®-based PCs, to powerful workstations, Java™ network computers and

—with performance that goes beyond conventional networks.

Join industry leaders

Industry leaders and users alike are rapidly recognizing the strengths of the Citrix thin-client/server computing approach. Last year, Microsoft licensed Citrix® MultiWin™ technology to create a multi-user version of Windows NT® Server 4.0 and future versions of Windows NT. IBM, Hewlett-Packard and other strategic partners have licensed Citrix ICA® (Independent

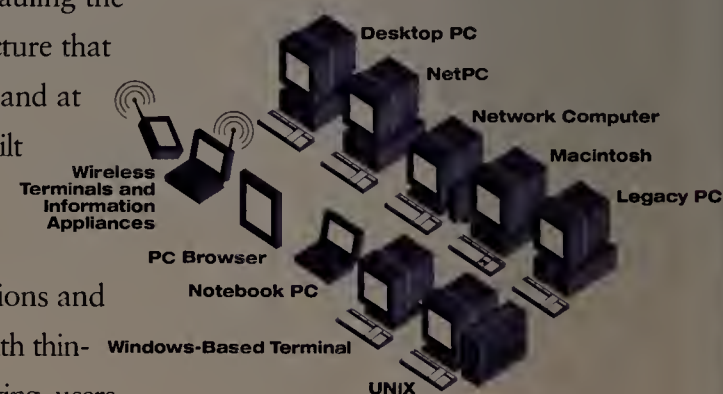
“It turned out that our office saved around \$6 million because Citrix software could help us do more with less available resources.”

Truman Legg,
Public Defender's Office, Orange County, CA

With thin-client/server computing, you can extend your resources further than ever before. Because applications and data are deployed, managed, supported and executed 100 percent on the server. And client devices, whether “thin” or “fat,” have instant access to these applications. Sessions run concurrently on the server, without sacrificing application performance.

Thin-client/server computing

is not about replacing or overhauling the network infrastructure that you've carefully—and at great expense—built up over the years. And it's not about scrapping applications and rewriting code. With thin-client/server computing, users have access to the latest 16- and 32-bit Windows® applications, from any device, from anywhere—even over dial-up connections



Citrix provides high-performance, thin-client software solutions that allow any client to access 32-bit Windows-based applications.

CITRIX®

Computing Architecture), enabling any client to access Windows-based



applications on the servers. Today, Citrix Systems has an installed base of over one million concurrent user ports servicing over three million users daily in companies like R.R.Donnelley, Honeywell and Bell Mobility.

Citrix is the answer

Why are more and more organizations choosing thin-client/server computing?

1) It's available right now, 2) it can reduce the complexity of your network so you can lower your total cost of ownership—by as much as 57 percent*—and 3) it offers

enhanced benefits to IT managers and end users.

Management and scalability:

Using thin-client/server computing, IT professionals can deploy, manage and support applications from a single location in minutes across a network of any size.

Access: Users can access 32-bit Windows-based applications from virtually any client device, including legacy 286, 386 and 486 PCs, Pentium-based computers, network computers,

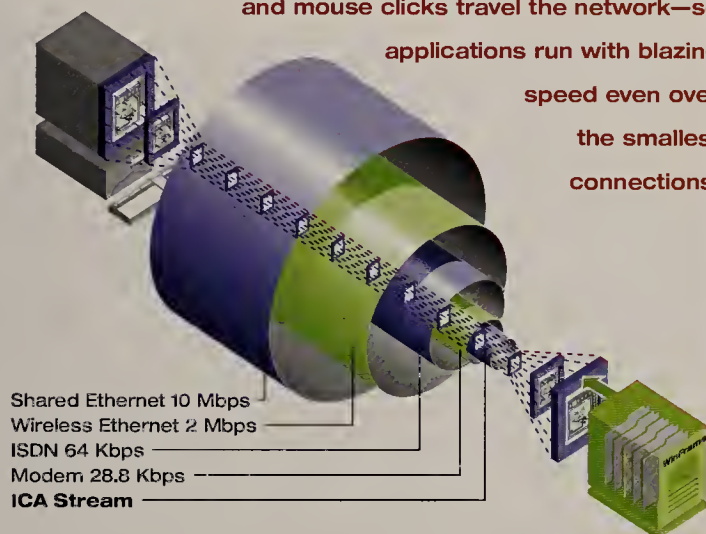
Windows-based terminals, UNIX® workstations and Macintosh® systems.

Performance: Thin-client/server computing can provide LAN-like application performance and superb responsiveness, even over low-bandwidth connections.

Security: Thin-client/server computing keeps vital information on the network and offers everyone access to the same centralized information.

With thin-client/server computing, you'll be able to

With ICA, only screen updates, keystrokes and mouse clicks travel the network—so applications run with blazing speed even over the smallest connections.



make the most of your technology investment. Network and staff efficiency goes up while reliance on new hardware and technology goes down. The result? You lower your total cost of computer ownership.

WHAT IS A WINDOWS-BASED TERMINAL (WBT)?

You choose the right client for your needs.

One of the beauties of thin-client/server computing is the flexibility it provides for selecting client devices. Because in thin-client/server computing it's the function that's important, not the hardware.

Which device? A thin-client/server client device can be any network-connected system accessing a Windows-based application executing on a server.

Either "fat" or "thin." It doesn't matter whether the client system is a full-featured "fat" computer, like a desktop, notebook, workstation, or Java-based network computer, or whether it's a "thin" client, like a Windows-based terminal (WBT), or wireless information appliance.

With any O/S. It doesn't matter whether the client uses the Windows operating system, or a non-Windows-based platform like DOS, UNIX, Java, Mac OS or OS/2®.

From any site. And it doesn't matter whether the client is at headquarters, in a branch office, at home, in a hotel, airport or anywhere else.

Same Windows performance.

With Citrix thin-client/server computing, everyone gets the same familiar look and feel of Windows and the same high performance from applications. But they have the ability to select the client device that best meets their individual needs.

Citrix Provides Robust Solutions For Thin-Client/Server Computing



he Citrix family of thin-client/server computing solutions have been specifically designed to help take your enterprise computing further — toward the connectivity and manageability you want. They're the highest-performing, most cost-effective and most secure way to deploy, manage and access business-critical applications across your enterprise network.

Now both administrators and end users can do their jobs more easily—and better. And you get a better return on your existing infrastructure.

Citrix thin-client/server solutions extend Windows-based applications. In fact, Microsoft Corporation has licensed Citrix multi-user technology and endorsed Citrix thin-client/server technology.

Citrix solutions provide three key benefits:

- **Heterogeneous computing environments:** Finally, you can make Windows-based applications available to everyone—and still let users keep their desktop of choice. Citrix solutions support all types of hardware, all types of operating platforms, all network connections and all LAN protocols. Your network can reach further, because it's not limited by your existing equipment.

- **Enterprise-scale management tools:** Citrix thin-client/server products give you enhanced management tools for applications on Microsoft® Windows NT-based networks. You can easily add servers without reconfiguring systems, administer applications across multiple

And because thin-client/server computing offers bandwidth-independent performance, local users can experience improved application performance, even when network traffic is heavy.

Extending Windows NT

The popular Citrix WinFrame® family of solutions

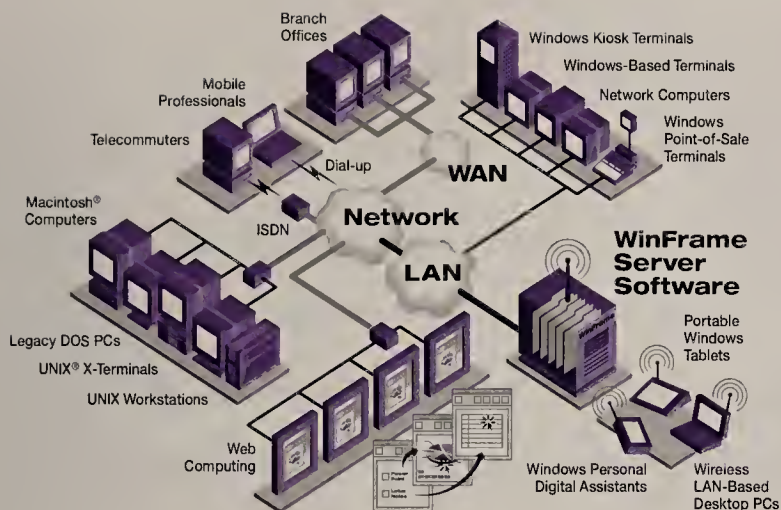
“Like a kid in a candy shop, physicians and their staff have applications at their fingertips.”

John Ernst, Clarian Health

servers from a single point and protect vital data and applications on the server.

- **Seamless desktop integration:** When you employ a Citrix thin-client/server solution, users enjoy the familiarity of a local desktop even though applications are running from the server. So the need for training is decreased and productivity is increased.

already is enabling over 3,000 businesses worldwide to provide enterprise-wide access to Windows-based applications. The newest member of the Citrix family is the “pICasso” Project, which received the *BYTE* magazine “Best Networking Tool and Application” award at COMDEX/Fall 1997.



With Citrix thin-client/server solutions, access to Windows-based applications is available to users with varied needs, across a broad range of locations.

Complete product family



The Citrix family of robust products ensures the best in

application access, performance, manageability and security. Each meets the needs of demanding enterprise environments—providing the most advanced thin-client/server functionality in solutions designed to keep your business productive and efficient. And they work today.

CITRIX FAMILY KEY FEATURES AND BENEFITS

Feature-rich Citrix solutions provide connectivity for heterogeneous computing environments, enterprise-scale management tools and seamless desktop integration.

Any client device. Citrix makes thin-client/server computing possible using virtually any client device, including PCs, terminals, network computers and wireless devices.

Any connection. Citrix solutions can make connections over telephone lines, wireless devices, the Internet and more, making it ideal for extending bandwidth-hungry applications to users.

Application publishing. Administrators can easily deploy applications across multiple servers from a single point.

Application launching and embedding. Windows-based applications can be launched from or embedded into HTML Web pages.

Load balancing. For optimum application performance, administrators can group servers into “farms” and route users to the least-busy server.

Session shadowing. Administrators can see a user's display or control the mouse and keyboard, for easy support and training.

Local/remote clipboard. Users can cut, copy and paste between applications running on the server or desktop.

Drive mapping. Users have complete access to

disk drives. Data from a server application can be saved to a user's local drive.

Printer mapping. Users can transparently access local printers. Mobile users can print remotely.

Port mapping. Peripherals can be accessed by applications running remotely from a server.

Audio support. Sound Blaster® Pro audio support makes a Citrix solution the ideal tool for education, training and the Internet.



Industry-Leading Partnerships Deliver Solutions You Can Trust

Every so often, a big idea comes along that everyone wants to get behind. And thin-client/server computing is one of those ideas. The Citrix Business Alliance is enrolling a growing number of industry leaders to focus on delivering reliable, scalable, cost-effective solutions for business-critical enterprise computing.

Through these partnerships, Citrix works to ensure that its thin-client/server technology functions seamlessly with other vendors' hardware and software. These partnerships are also working to create future products that will help you take full advantage of the benefits of thin-client/server computing.

Microsoft

The recent joint development agreement between Citrix and Microsoft Corporation represents a key partnership. But Citrix and Microsoft have been partners for years. In developing its WinFrame solution, Citrix licensed Windows NT source code, which serves as the base operating platform for the thin-client/server software.

In the development agreement, Microsoft licensed Citrix technology that provides

multi-user capabilities for Windows Terminal Server. This multi-user server core provides



Industry partnerships ensure the development of new products that give you more ways to use Citrix solutions.

the ability to host multiple, simultaneous client sessions on Microsoft Windows NT Server 4.0.

Compaq

A worldwide joint marketing agreement between Citrix and Compaq Computer Corporation promotes the benefits of thin-client/server computing to customers and channel members.

These initiatives feature Citrix WinFrame thin-client/server software and Compaq® server hardware as an advanced solution to lower the cost of ownership for mission-critical enterprise computing.

Compaq has also included Citrix WinFrame thin-client/server software as an option in its innovative SmartStart™ program, an integration tool that optimizes platform configurations and simplifies the installation of servers and software.

Inclusion in the SmartStart program simplifies configuration and lowers WinFrame's installation time on Compaq servers.

Hewlett-Packard

A licensing agreement with Hewlett-Packard Company permits the systems vendor to embed Citrix ICA thin-client/server technology for Windows and Java into future product lines.





This agreement will enable ICA-based thin-client devices and network computers to access standard Windows-based applications executing on Citrix-based servers, helping businesses reduce costs and increase efficiencies by extending Windows-based applications to more devices. Users will also benefit from the ability to access Windows and Java applications from the same device using Citrix thin-client/server technology.

Wyse

Through a long-standing partnership with Citrix, Wyse Technology and its line of Winterm™ terminals provide the broadest array of thin-client devices on the market. Winterm thin clients enable users to run standard Windows-based applications in conjunction with current and future multi-user application server software from Citrix.

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Hewlett-Packard wanted to deploy human resources software to more than 25,000 employees throughout Europe. A Citrix thin-client/server computing solution enables applications and information to be managed centrally, while giving any employee real-time access to critical data for easy updating and tracking.

BM Polyco, a worldwide supplier of utility gloves for the

industrial and retail markets, chose a Citrix solution to provide real-time information to suppliers and employees across a mixed environment of operating systems and client hardware. Thin-client/server computing reduced administrative overhead and simplified the deployment of business-critical applications.

The City of Tulsa Park and Recreation Department saved critical taxpayer dollars with a Citrix solution on an installed base of low-end hardware. Thin-client/server computing enabled the department to distribute a recreation automation package across more than 20 sites that enabled park users to reserve a facility or enroll in a class from any location system-wide.

The Bank of Walnut Creek realized a 40-percent savings in up-front capital costs with thin-client/server computing. The Citrix solution eliminated the need to purchase servers and hire network administrators at each branch, while providing access to business-critical applications for PCs and older teller terminals across an inexpensive frame-relay WAN.

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☐ Application name(s) _____

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☐ Branch offices over the WAN

☐ Users of thin-client devices

☐ Internet users

☐ Wireless LAN users

☐ Intranet users

3. What is your project time frame? (check one)

☐ 1-3 months

☐ 4-6 months

☐ More than 6 months

4. How can we be of assistance?

(check all that apply)

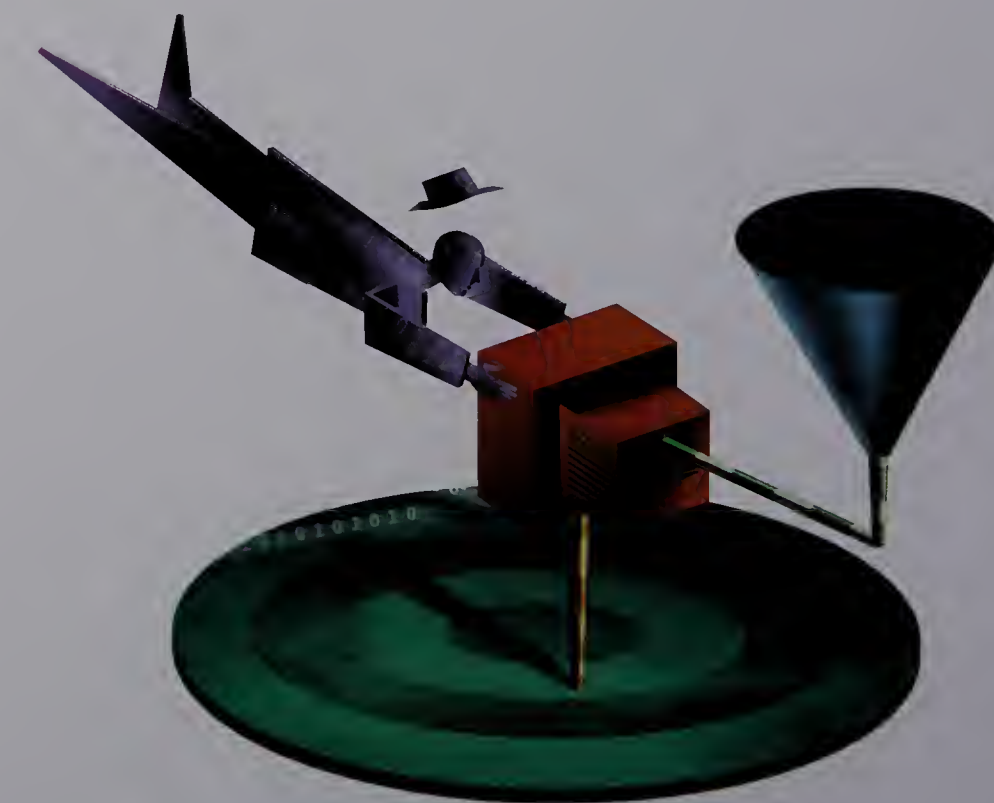
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*Desktop Clients, A Cost of Ownership Study, Spring 1996, Zona Research, Inc.

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Carriers & ISPs

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Briefs

Internet access prices are going up around the industry, but **BellSouth.net** is trying to reverse the trend by lowering prices. **BellSouth.net** is offering customers a \$17.95 per month unlimited dial-up Internet access service if they sign with the regional ISP for 12 months. **BellSouth.net**, like many other ISPs that target consumers and small-business users, is trying to pick up **America Online, Inc.** customers who recently have seen price increases. **BellSouth.net** even has part of its Web site dedicated to showing potential customers how **BellSouth's** service compares with **AOL**.

WorldCom, Inc. and competitive local exchange carrier **GST Telecommunications, Inc.** have established **frame relay network-to-network interconnections** in Los Angeles and Honolulu.

Vancouver, Wash.-based GST said the move will enable its customers, mostly in the western U.S. and Hawaii, to obtain frame relay links to 20 foreign countries.

The Octel Messaging Division of **Lucent Technologies, Inc.** — formed last year when **Lucent** bought voice-messaging market leader **Octel Communications Corp.** — is recruiting distributors to sell unified messaging products. **Lucent** announced the formation of the **Lucent Messaging Integrator** channel to deliver and support the **Octel Unified Messenger** for **Microsoft Exchange**.

RSL Communications, Ltd. last week announced that its domestic subsidiary **RSL COM U.S.A., Inc.** is acquiring **Westinghouse Communications** for \$90 million in cash. **Westinghouse**, a division of **CBS Corp.**, offers data and voice services over a nationwide network. The acquisition is expected to be final by the third quarter.

OpenPort aims to make IP faxing ubiquitous

With UUNET under its belt, Open Port is inking other ISPs and developing real-time fax software.

By Denise Pappalardo
Chicago

Open Port Technology, Inc. is looking to take its IP fax wares to the masses.

The company has a variety of plans on tap. First, it will sign up new ISPs to use its existing Harmony IP fax software. Then the company is expected to announce and deploy its first real-time IP fax software.

IP fax lets customers use their existing Internet connections for faxing instead of their telephone lines, which incur charges based on the distance and length of the transmissions.

Last year business users in the U.S. spent \$25 billion on fax transmissions, said Maury Kauffman, president of the Kauffman Group, a Cherry Hill, N.J.-based consultancy.

The cost of IP faxing is increasing, and users are looking for easy and less expensive ways to manage their faxing expenses, Kauffman said.

A deal with Gric

On the ISP front, Open Port is expected to announce that Gric Communications, Inc. has signed on to deploy Open Port's store-and-forward Harmony IP faxing software to support its GricFax IP faxing service.

Gric, a consortium of ISPs from around the world, offers global Internet access roaming and settlement services.

Today Gric offers a fax service based on NetXchange Communications, Ltd.'s software, but declined to say how the new Open Port software would fit in.

Open Port is also expected to announce a new real-time IP faxing software product that will ship by year-end, said Jennifer Schuster, vice president of marketing at Open Port, based here.

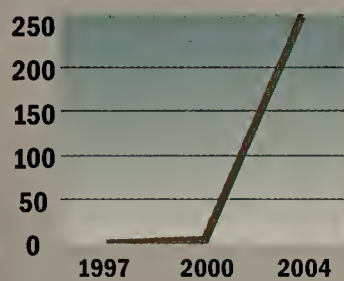
Instant faxes

Real-time fax support will let users get a document to a client instantly, Kauffman said. Today, most IP faxing technologies support store-and-forward schemes, he said.

IP FAX MARKET EXPLODES

Analysts expect the IP fax market to explode in coming years because upwards of 1.55 billion users will have access to IP faxing services.

Number of pages sent through IP faxing (in billions)



SOURCE: IDC, FRAMINGHAM, MASS.

“Real-time faxing will become a checklist item [for users],

but the transmission costs to support real-time are going to be too high for most users,” he said.

However, some ISPs are already looking to support real-time fax services.

For example, IBM Global Services is evaluating Open Port's technology in its labs but has not yet committed to rolling out these products, said an IBM Global Services spokesman.

Connection with UUNET

UUNET Technologies, Inc. has been deploying Open Port's store-and-forward products to support its UUFax service since July of last year.

Open Port's major competitor in the IP fax arena is NetCentric, Inc. NetCentric has also signed up a handful of ISPs such as PSINet, Inc., Netcom On-line

Communication Services, Inc. and GTE Internetworking to offer services based on NetCentric's software.

Open Port's and NetCentric's products are similar in many ways but handle IP fax traffic differently, analysts said.

For instance, Open Port lets ISPs allocate ports on their Internet access devices as needed, while NetCentric's technology requires ISPs to dedicate specific ports for IP fax traffic.

One method is not better than the other, Kauffman said, adding that it all depends on how the ISP wants to support its services.

Open Port has developed an API that will let other fax server vendors interoperate with the Harmony software.

© Open Port: (312) 867-5000

GTE Internetworking offers stronger SLAs

By Denise Pappalardo
Cambridge, Mass.

If you're looking for guaranteed Internet performance, GTE Internetworking's new service-level agreement (SLA) might put your mind at ease.

The company last week announced a new SLA that promises its Internet Advantage dedicated Internet access customers will get the first minimum packet loss guarantee from an ISP.

If Internet Advantage customers experience more than 10% packet loss during any 10-minute interval, they will be credited with one day of service, said Richard Kane, service line manager for Internet Advantage at the ISP. This guarantee, like most from any of the ISPs, does not extend beyond GTE Internetworking's backbone.

Internet Advantage customers are typically accessing GTE Internetworking's network using either a dedicated leased line or a frame relay connection. Access speeds range from 56K bit/sec to 45M bit/sec.

GTE Internetworking is one of the first national ISPs to add a

minimum packet loss guarantee to its standard dedicated Internet access service offering, said Rebecca Wetzel, director of Internet services at TeleChoice, Inc., a Verona, N.J.-based consulting firm.

information about packet loss or delays,” Kane said. “If a customer reports trouble to us, we will then look at that part of our network for one hour before the reported trouble and one hour after,” he said.

Guaranteeing its packets

GTE Internetworking takes its service-level agreement guarantees one step further by including a minimum packet loss promise. Dedicated Internet access customers will get one full day's credit if they:

- Cannot reach any Internet destination or IP address for 10 minutes or longer due to a failure or problem in GTE Internetworking's backbone
- Experience packet loss that equals 10% or more of their given traffic load over a 10-minute period

GTE Internetworking also refined its network availability guarantee. The ISP's previous SLA stated that if a user could not reach any destination on GTE Internetworking's network for 15 minutes or longer, they would be credited. The ISP has now made it 10 minutes or longer.

“Users can do a trace router to identify the path their traffic is trying to traverse over our network, and that will give them

GTE Internetworking gathers and stores network performance statistics information on a centralized database.

The one key drawback to the SLA is the lack of any Web-based monitoring tools for customers. But users can simply ping a router on GTE Internetworking's network and report trouble to the ISP, Kane said.

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WorldCom riding financial wave

By Rebecca Sykes and Denise Pappalardo
Jackson, Miss.

WorldCom, Inc., the "shopaholic" telecommunications carrier, has posted first-quarter revenue of \$2.35 billion, a

38% increase over the \$1.7 billion reported in last year's first quarter.

WorldCom attributed its strong revenue growth to increased demand for domestic private line and data services as

well as for international and Internet services. Revenue from each of these services grew by more than 20% compared with last year's first-quarter results. Traffic volume increased 38% over last year's first-quarter traffic.

Despite ongoing criticism from some industry watchers regarding WorldCom's pending \$37 billion acquisition of

MCI Communications Corp., WorldCom appears to be riding a strong financial wave.

The carrier posted first-quarter earnings of \$193 million, nearly eight times the \$25 million earned in the first quarter last year.

However, the earnings figure for this year's first quarter does not take into account charges related to WorldCom's purchase of competitive local exchange carrier Brooks Fiber Properties, Inc. and several other transactions. Charges for Brooks Fiber alone were \$69 million in the first quarter.

Despite the federal government's investigation into WorldCom's pending acquisition of MCI, the companies expect to finalize the deal by mid-year. Most analysts doubt the deal will be complete before year-end.

Sykes is a correspondent with IDG News Service's Boston bureau.

Get more online:

- The latest WorldCom financial and stock info
- Overviews of the issues surrounding WorldCom and the Internet

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Wireless service providers choosing CDMA over GSM

By Rebecca Sykes

Scottsdale, Ariz.

As personal communications services (PCS) grow in popularity, one network technology is surfacing as a favorite among U.S. service providers.

Digital wireless PCS services based on the Code Division Multiple Access (CDMA) standard are outpacing deployments of Europe's dominant wireless telephony standard, GSM, according to a new study by In-Stat, a consultancy based here.

Overall, GSM's share of the U.S. PCS market is expected to drop from 44% to 37% by 2001, according to Ray Jodoin, senior analyst at In-Stat.

GSM is and will remain dominant in Europe, but the technology is losing steam as service providers in Asia and North and South America deploy GSM and CDMA networks, Jodoin said.

"GSM has not become the worldwide pervasive network that the GSM operators would have liked it to become," Jodoin said. CDMA offers service providers better quality voice services compared with GSM, and that is giving the technology an edge among domestic carriers.

"CDMA is a newer technology and has the advantage of 10 years of development over GSM," he said. ■

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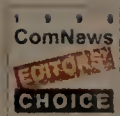
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EYE ON THE CARRIERS

All stressed out on frame relay

Two weeks before you plan to visit a particular city, it's hit by an earthquake or a terrorist bomb. Do you cancel your trip?

Travel experts usually say no. Their logic: Either nature won't let the same thing happen twice so quickly or officials will take extra steps to prevent another act of violence. So go, and have fun.

Unfortunately, most IT analysts can't quite bring themselves to the same conclusion about the AT&T frame relay network after its meltdown last month. And that tells you something about the state of data services at the large carriers.

"There is a 50% chance we will

see another outage of this enormity," Howard Anderson, president of The Yankee Group, told my col-

league Sandra Gittlen of Network World Fusion. Not even AT&T Chairman Michael Armstrong has yet declared the problem mended, though he's found the "root cause" in a mix of procedural errors and software bugs.

Wouldn't you think that AT&T would make darn sure this wouldn't happen again? I'm sure AT&T is trying its hardest. But the issue isn't so much what triggered the problem as what would stop it, according to experts.

Once one of AT&T's Cisco StrataCom frame relay switches began propagating alarms through the network, the switches couldn't turn off the spigot of administrative messages until their traffic forwarding tables were compromised. But other AT&T networks don't have that problem.

Consider AT&T's circuit-switched network—or voice-grade network, if you will. It uses a system of Digital Access and Cross-Connects (DACS) to split traffic among switches and services. The DACS boxes have the ability to quickly "reinsert a recent image" in case of a failure of one of the boxes, said Frank Ianna, AT&T's executive vice president for network services in a recent conference call.

By contrast, AT&T officials said the StrataCom switches had to spend hours communicating with one another to re-establish their forwarding tables.

That's a real red flag to analysts. "You should always be able to return to a prior image. That's a tenet that you see on the real carrier-class switches," said Frank Dzubeck, president of Communications Network Architects, Inc., a consulting firm in Washington, D.C.

Here, once again, AT&T is hampered by the legacy of past top executives who didn't catch on about the growth of corporate and public data networks. As a

result, AT&T is still stress-testing networks such as frame relay after being inundated by orders from people who couldn't give a hoot about the Dime Lady, 10-321, Olym-

pics sponsorship, regional Bell operating company rate of return or other issues that fascinated former Chairman Bob Allen and his cronies.

"It seems to me that the data world is still growing up to where the circuit world has been," Dzubeck said.

Growing up means giving users confidence that lightning can't strike twice in

the same spot, in AT&T's network most of all. Can Armstrong concentrate enough resources on giving users that confidence? Much of the future of carrier data services depends on it.

Rohde is Network World's senior editor of Carriers & ISPs. He can be reached at david_rohde@nwfw.com.

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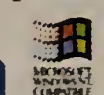
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The Federal Communications Commission

Commissioners press FCC for change

By David Rohde

Remember the old line you learned in school about the Holy Roman Empire? Historians said it was neither holy, nor Roman, nor an empire.

Often observers have thought something similar about the Federal Communications Commission. OK, it is certainly part of the federal government, and it surely has something to do with communications. But a commission? Under former Chairman Reed Hundt, it seemed more like a dictatorship.

All that has changed recently. Now the FCC's five voting members constitute a real debating society.

When President Clinton last fall appointed William Kennard chairman of the FCC, he also named three other commissioners who have proven to be independent thinkers. The one holdover from the Hundt era, Commissioner Susan Ness, had already distinguished herself as the only one who ever cast dissenting votes on telecom-related issues.

The upshot for network managers and their carriers: Since Kennard took office six months ago, much of the accepted wisdom around the FCC has come under attack. Some of the Hundt-era consensus in favor of the tight regulation of dominant carriers and ample funding for expanded universal service projects — ultimately paid for by users — has started to break down. But with more than 2,000 people on staff, the FCC is a big ship to turn around, and the Hundt-era principles are still hanging on, if only by a thread.

The first sign of a major change at the FCC came Jan. 15, when new Commissioner Michael Powell published a white paper asking for a subtle but key change in the process by which regional Bell operating companies apply for entry into the long-distance market.

The white paper, tellingly titled "A Wake-Up Call," proposed that all state and federal regulatory bodies involved in deciding whether an RBOC can enter the long-distance business should work collaboratively.

For the first two years after the enactment of the Telecommunications Act of 1996, the FCC, the Department of Justice and the state regulatory agencies had largely worked separately. That practice led RBOCs to complain that they were facing conflicting requirements to gain long-distance entry.

Now under the procedure suggested by Powell, the New York Public Service Commission and the Justice Department, reportedly with the tacit agreement of the FCC, have jointly signed off on conditions that Bell Atlantic Corp. could meet to gain long-distance entry.

In another break from Hundt's practice, Kennard has been willing to publicly criticize the long-distance carriers, further easing the burden somewhat off the aggrieved RBOCs, whose offi-

cials have long thought the FCC was biased against them.

After the long-distance carriers recently began adding new charges to residential and business phone bills, then blaming those charges on new universal service charges mandated by the FCC, Kennard wrote the CEOs of AT&T, MCI Communications Corp. and Sprint Corp. to complain. Kennard maintained that the FCC never asked the carriers to pass along the charges to users.

The agents of change



"We must make sure that the information highway has on ramps and off ramps in every neighborhood."

William Kennard, FCC chairman, on the goals of universal service.



"... no one likes to lose his or her money, especially in taxes and charges they do not know about, especially when the taxes and charges are expressly hidden by the government."

Harold Furchtgott-Roth, FCC commissioner, on universal service surcharges.



"We must guard against techno-euphoria. Any good network engineer would have told you that the idea of local competition had real short-term limitations."

Michael Powell, FCC commissioner, on local competition.

In addition, Kennard appears to be less willing than Hundt was to accept at face value the explanations by AT&T and MCI as to why they find it so difficult to compete in the local exchange market. At a February press conference marking the second anniversary of the telecom act, Kennard questioned why AT&T and MCI said they couldn't economically resell RBOC lines when some new carriers in New York City, such as RCN Corp., are making a go of it.

Yet some members of Congress think the FCC has still moved too slowly to allow RBOCs into the long-distance business, and have complained that the FCC still isn't hard enough on long-distance carriers.

In a particularly embarrassing episode for the

FCC, the General Accounting Office (GAO), the investigative arm of Congress, last month played a trick on the FCC to see if the commission could detect a dishonest long-distance reseller bent on "slamming" customers. Slamming is the practice of changing a user's long-distance carrier without the user's authorization.

At a Senate subcommittee hearing last month, GAO Assistant Comptroller General Elijah Bowron revealed that the GAO had filed a bogus tariff for long-distance service under the fictitious name "PSI Communications." The FCC let the tariff take effect without further investigation, even though the petition lacked the filing fee and contained numerous errors and omissions.

"The FCC's tariff-filing procedure is no deterrent to a determined slammer," Bowron concluded. Still, many of Kennard's policies are practically the same as Hundt's — particularly in the area of universal service. Hundt came under fire for ordering up the new \$2.25 billion per year E-rate subsidy for Internet access and other network services for schools and libraries, while only reducing RBOC access fees by a relatively small amount. Kennard has not only supported Hundt's funding level, but has traveled extensively to schools to promote E-rate.

The issue of E-rate is where new Republican Commissioner Harold Furchtgott-Roth has spoken up. A conservative economist, Furchtgott-Roth has openly criticized the FCC's May 1997 decision to expand universal service to provide Internet access subsidies. According to Furchtgott-Roth, that action is what has resulted in the numerous hidden fees that Kennard and the long-distance carriers have battled over.

On April 10, Furchtgott-Roth was the lone FCC commissioner to dissent on the agency's universal service report to Congress.

In the report, the FCC suggested it might have to start regulating Internet telephony by requiring IP telephony carriers to contribute to the universal service fund.

In his dissent, Furchtgott-Roth complained that the FCC has already imposed enough of what he labeled "untenable taxes" on users to pay for new universal service programs.

"Congress did not envision substantial new taxes on interstate or other telecommunications services as a result of the Telecommunications Act of 1996, nor did it envision price increases — much less substantial price increases — in any telecommunications market," Furchtgott-Roth said.

Few political observers believe Furchtgott-Roth's perspective on universal service will carry the day. Kennard's advocacy of an expanding universal service program is strongly backed by Ness. So Kennard only needs the vote of Powell or the other new commissioner, Democrat Gloria Tristani, a former member of the New Mexico Public Utility Commission, to get the program approved. ■



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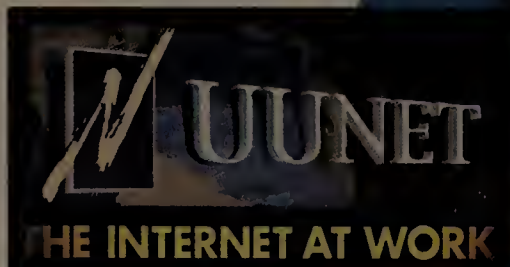
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Briefs

■ **PC DOCS, Inc.**, of Burlington, Mass., has named **Brian Zanghi** as its new president. Zanghi had been serving as the company's vice president of North



PC DOCS' Zanghi

American sales. A three-year PC DOCS veteran, Zanghi previously worked at Interleaf, Inc. and Digital Equipment Corp. PC DOCS last week also announced an expansion of its DOCSFusion document management product line. Due for delivery this summer is a new Windows client, an improved Web client, routing capabilities and integration with Fulcrum Technologies, Inc.'s Search Server.

© PC DOCS: (781) 273-3800

■ **AbirNet, Ltd. and CyberGuard, Inc.** will be on hand at NetWorld+Interop 98 in Las Vegas this week to strut their security stuff. AbirNet will show off a new edition of the company's Windows NT-based SessionWall-3 intrusion detection software. Version 3.0 monitors NT users' IDs, not just IP addresses, and can detect a network intrusion even when the attacker deliberately fragments his transmission stream to try to avoid detection. AbirNet also plans to announce a product called SessionWall Enterprise, scheduled for December release. The product will be able to report intrusion attempts across multiple network segments to a central console.

Meanwhile, CyberGuard will announce Firewall for NT 4.0, which is designed to work on Microsoft Corp.'s Internet Information Server and with the Microsoft proxy server. CyberGuard's firewall, which costs \$1,495, adds network address translation and alarm/alert capabilities to Microsoft's proxy server.

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In-Site

Investment firm buys into public-key encryption

Salomon Smith Barney has come to rely on digital certificates for securing equities deals.

By Ellen Messmer
New York

If you've got the nerve to do millions in equities investments over the Internet with your global trading partners, you'd better have the smarts to put a solid security system in place.

Salomon Smith Barney, which conducts big money trades online with about two dozen institutional investment firms, has turned to public-key digital certificate technology to protect its transactions from 'Netsnoops.

The Wall Street powerhouse, which merged recently with Travelers Group to form a \$9 billion company, has been using public-key certificate technology from Entrust Technologies, Inc. since last summer.

The investment firm has dis-



Salomon Smith Barney's Ted Jestin would like to see his company extend its use of public-key infrastructure technology to the retail stockbroker side of the business.

tributed X.509 digital certificates to 200 of its employees and 25 of its largest trading partners, allowing users to digitally sign and encrypt documents involved in making equities deals.

The digital certificates also

provide a way to authenticate a user's identity before granting the person access to the subscriber-only equities research Salomon Smith Barney publishes on the World Wide Web, said Ted Jestin, the company's global director of infor-

mation security services.

Managing the X.509 certificates has presented few problems, Jestin said. Salomon Smith Barney has a server based on the Lightweight Directory Access Protocol (LDAP) to store certificates and an Entrust Certificate Authority (CA) server to generate and validate them, he said.

The certificates work inside investors' Web browsers, automatically presenting themselves at Salomon Smith Barney's Web site to check on user identities. The LDAP server holding the certificates lists users' online privileges. If the CA server validates the user's certificate, the institutional investor is allowed access to subscriber-only material on the Web.

But to transact an actual
See Public-key, page 60

Using 'body language' to secure networks

By Ellen Messmer
Carlisle, Pa.

Biometric security devices can be used to guard network access by checking a user's fingerprints, eyes, voice or other physical traits instead of a simple password. But the relative novelty of using biometric products to safeguard corporate networks has raised questions about how well the technology actually works.

Last week, the International Computer Security Association

(ICSA) gave the technology a boost.

The ICSA, which conducts a wide range of security product tests, gave six biometric products its stamp of approval after they passed a round of rigorous ICSA tests conducted in both laboratory and customer environments.

The six products are:

- TrueFace, from Miros, Inc., of Wellesley, Mass. The product is used in automated teller machines in place of bank cards.

- Touchstone, from Mytec Technologies, Inc., of Toronto. This fingerprint-matching device is used for secure network access, electronic commerce, e-mail encryption and database management.

- NRIdentity, from National Registry, Inc., of Tampa, Fla. The offering can authenticate users logging onto a Windows NT server domain from remote Win-



SAC Technologies' SACcat lets you do biometric-based authentication.

dows 95 or Windows NT client workstations, or approve electronic documents.

- SACcat, from SAC Technologies, Inc., of Edina, Minn. The product provides secure Internet access.

- Biometric Access Control System, from Hi-Key Technologies, of Eden Prairie, Minn. This is a centralized informa-

tion management system based on fingerprint identification technology.

- Citadel Gatekeeper, from Intelitrak Technologies, Inc., of Austin, Texas. This is a voiceprint gateway server used to verify users' network access rights.

"We recently started testing biometric products, and these six have reached certification status," said Peter Tippet, president of the ICSA, based here. He added that the group's work should provide assurance to users interested in this new type of secure authentication.

In its new handbook, called the "Biometric Industry Product Guide," the ICSA identified 170 products that authenticate user identity based on physical traits.

"Many people are uncertain about using biometric products," said Tom Grecco, Mytec's president.

But with independent evaluations such as ICSA's certification process, he said the market may get the boost it needs. ■

Get more online:

- White papers that explain biometrics
- Overviews of the products mentioned in this article

www.nwfusion.com



CacheFlow tackles Web performance

New device aimed at remote offices improves response times, speeds 'Net downloads.

By Elinor Mills
Palo Alto, Calif.

CacheFlow, Inc. last week introduced a

device that speeds up response time on the World Wide Web by using caching technology designed to reduce redun-

dant download requests made over the Internet.

The CacheFlow device can download

in one second what it takes five to 10 seconds to do on noncached networks, according to company officials.

CacheFlow 100 is a rack-mounted appliance designed for installation near groups of users, such as at remote office WAN access points or on departmental LANs, where the device can cache the most frequently requested Web content. The product's operating system, dubbed CacheOS, enables active caching so users can get refreshed content.

Customers can attach CacheFlow 100 to a LAN via a 10/100Base-T network interface. The new offering complements the company's higher end CacheFlow 1000 product, which is aimed at high-traffic areas, such as WAN access points and near firewalls, and serves an entire enterprise.

"[The CacheFlow 100 is] a great idea, and it really works well," said David Strom, an independent consultant in Port Washington, N.Y. "It took less than a second and, boom, [the Web page] was there."



The CacheFlow 100 network cache is similar to the previously released CacheFlow 1000, but with a smaller size and a focus toward sites with moderate-to-low traffic.

James Staten, an analyst at Dataquest, Inc. in San Jose, Calif., agreed with Strom.

"It's a good [package]," Staten said. "We're starting to see a lot more emphasis on caching to reduce bandwidth consumption."

Tough guy

However, he said cache servers can be a tough sell to network administrators, who might not see the need to buy such products until the administrators get barraged with complaints from users about network speed or lack of it.

One benefit CacheFlow devices have over traditional proxy servers is CacheFlow's products can figure out the best caching scheme to configure, Statensaid.

Netscape Communications Corp. and Microsoft Corp., among others, have proxy servers that do some caching. But Strom and Staten said a dedicated caching device is better because adding caching functionality to a server can reduce the server's overall reliability.

The new CacheFlow product, which boasts 2G bytes of storage and 128M bytes of memory, costs \$8,900. The offering is available now.

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Mills is a correspondent with IDG News Service's San Francisco bureau.

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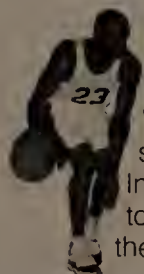
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Public-key

Continued from page 57

trade, Salomon Smith Barney adds an extra security check.

"At that point, because we are dealing with large trades, we authenticate the investor yet another way using a SecurID

card," Jestin said. "Then the investor can fill out a form."

The palm-size encryption-based hardware cards from Security Dynamics, Inc. generate continuously changing passwords. These one-time "dynamic" passwords are much safer than static, reusable passwords, which are compromised once others obtain them, Jestin said.

When a user enters the SecurID password at the Salomon Smith Barney Web site, the user is validated by the Security Dynamics ACE/Server, another piece of IT security gear sitting behind the investment firm's Web server.

Certificates for everyone

According to Jestin, Entrust charges

only \$1 per certificate. But more realistically, it costs Salomon Smith Barney \$150 to \$250 per seat, when you add in the cost of Entrust's CA server, a directory to hold the certificate and the people to manage it all.

Despite the costs associated with putting in security, Salomon Smith Barney thinks public-key encryption should be used on a far larger scale, including the retail stockbroker side of its business. Retail stock trades between brokerage houses involve far higher transaction volumes but lower dollar values than equities trades.

Today, these retail stock trades are done through phone calls. "But we could evolve to initiate trades by computer," Jestin said. "Certificates satisfy the authentication objectives."

Entrust charges only \$1 per certificate. But more realistically, it costs Salomon Smith Barney \$150 to \$250 per seat, when you add in the cost of Entrust's CA server, a directory to hold the certificate and the people to manage it all, Jestin said.

Salomon Smith Barney is working with the Securities Industry Association (SIA) to this end. In fact, the SIA could end up acting as the certificate authority for the entire brokerage industry by dispensing certificates to all registered brokers for retail stock trades.

Under this scenario, SIA — or its third-party representative — would manage the public-key certificate directory and validation servers. Jestin suggested this could simplify what might otherwise become a tangled process: each brokerage firm trying to handle the administrative chores itself.

In addition, having SIA as the central authority would bypass the interoperability problem plaguing digital certificates today. Certificates from one vendor can't reliably be validated against a server from another vendor until standards are passed and adopted.

As public-key management improves, Salomon Smith Barney plans to move along with the technology. And Jestin offered this bit of advice to other companies thinking of rolling out certificate technology: "Make sure your CA [equipment] can issue and automatically update certificates as they expire."

The company's Entrust CA will be merged with another product called Entrust Manager later this year, enabling Salomon Smith Barney to handle certificate upgrades and expirations. ■

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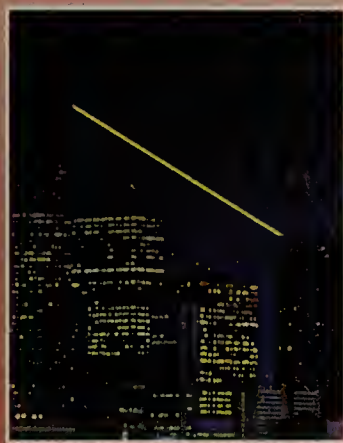
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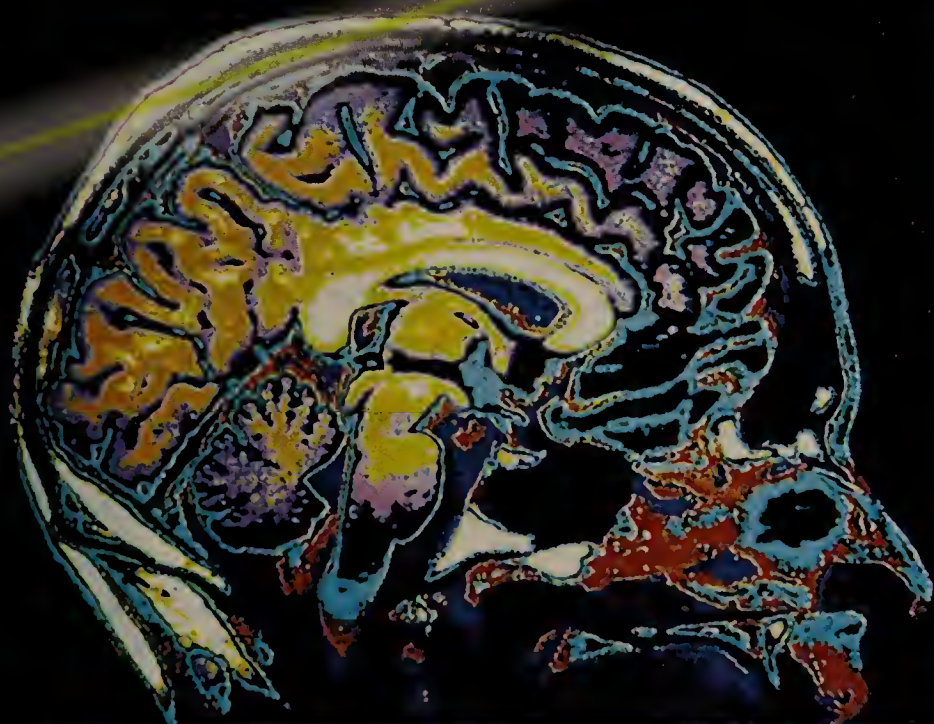


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**DO YOU
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RealNetworks gives multimedia apps a boost

By Chris Nerney
Seattle

The company that three years ago launched the first streaming media application last week unveiled a group of products that will allow enterprises to deliver synchronized multimedia presentations to employee desktops.

RealNetworks, Inc.'s new RealSystem G2 line of software is designed for creating and playing Internet and intranet audio, video and animation files.



RealNetworks CEO Rob Glaser: *The goal is quality audio and video, even at 28.8Kbit/sec.*

One version of the new product packages multimedia servers, players and authoring tools to enable enterprises to create and deploy intranet applications such as live executive broadcasts, company meetings, sales force training and enterprise learning.

Another RealSystem G2 package — geared toward public Web sites that use multimedia — allows content developers

to create synchronized audio, video, images, slides and text presentations. With this package, RealNetworks is trying to address two big problems routinely faced by users of Internet-based multimedia programs: 1) The constant need to download software that can run audio or video files in a growing number of formats, and 2) sluggish, spotty audio and video transmissions, especially at slower connection speeds.

"In terms of the quality of multimedia over the Internet, we're just not there yet," said Ron Rappaport, an analyst at Zona Research, Inc., of Redwood City, Calif. The primary goal of RealSystems G2 is to get users "there," according to RealNetworks CEO Rob Glaser.

Company officials said the key elements of RealSystem G2 are its support for a wide range of multimedia types and its new server-based SmartStream technology. Based on open standards, RealSystem allows users to run files in numerous multimedia formats, including AVI, JPEG, MPEG, WAV and AU.

SmartStream is designed to eliminate transmission problems caused by fluctuating bandwidth. If bandwidth slows while a large multimedia file is being transmitted, SmartStream enables the media stream to stop and give the client an opportunity to catch up. This process is called rebuffering.

Formerly known as Progressive Networks, RealNetworks introduced the first streaming media software, RealAudio, in 1995. Last year, the company launched RealVideo and RealPlayer, which combines audio and video capabilities. These products combined have the vast majority of market share for Internet streaming software.

Components and prices of RealSystem G2 are as follows:

- Basic Server Plus, for small businesses, costs \$695.
- RealSystem G2 Intranet Solution, for enterprises, starts at \$6,995. It includes the RealServer multimedia server, 100

RealPlayers and software for creating and encoding audio and video files.

• RealSystem G2 Internet Solution, for Web sites that broadcast audio and video, starts at \$5,995.

A beta version of RealSystems G2 is due out this quarter, with a final version slated to ship by year-end.

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Advertisement

Time's Up for T1 Multiplexers, Says Nortel's Conner.

The T1 multiplexer's era in the private network has passed. When time division multiplexing was created, voice traffic was the biggest concern to enterprises. A network's reliability and performance now hinge on its ability to handle ever-increasing data traffic. In recent years, data has replaced voice as the primary communications carried on enterprise networks. With today's increasing demand for performance and bandwidth management, TDM has been left behind as a network consolidation vehicle. With the onset of Year 2000, Y2K performance issues in T1 multiplexers are likely to be addressed through the expense of implementing Y2K patches.

Enterprises with mission-critical networks that rely on private T1 lines and outdated time division multiplexers could face a network that can't handle today's growing traffic demands. A Y2K patch may not be the best solution because TDM technology simply was not designed to function in today's bandwidth-hungry environment. As a result, many companies are abandoning TDM altogether and upgrading to advanced switching technology that resolves Y2K issues and handles increasing network needs.

"Time's up for T1 multiplexers," said F. William Conner, president of Nortel Enterprise Data Networks. "Enterprises that go for a Y2K patch are throwing good money after bad. Networks must be able to transition companies beyond the Year 2000 and meet performance, speed and reliability demands."

Nortel Enterprise Data Networks is helping many of its customers transition to Passport, a multimedia switch that will support integrated networking needs and meet the most stringent reliability requirements in the industry. Nortel's Passport allows its customers the flexibility to use today's most advanced networking technologies. Bandwidth and equipment cost savings of up to 50 percent, compared to TDM, enable an enterprise to pay for the technology in just a few years.

Nortel has developed a simple multiplexer replacement package featuring the Passport Enterprise Network Switch. Not only is it a complete long-term solution, the network will be transformed into a state-of-the-art system that will adapt to future needs with a true integration of voice and data.

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Microsoft snaps up MESA Group

By Paul McNamara
Redmond, Wash.

Microsoft Corp. last week bought itself a new weapon to use against Lotus Development Corp. in the ongoing fight for supremacy in the enterprise messaging market.

Microsoft acquired The MESA Group, Inc., a small Newton, Mass.-based software and services provider that specializes in migrating Lotus Notes applications and cc:Mail message archives to Microsoft Exchange Server. Terms of the deal were not disclosed.

Microsoft said it intends to integrate the MESA product set into future versions of Exchange Server, Microsoft's messaging and collaboration platform.

MESA's products include the following: the Application Assessment and Planning (ASAP) tool, which companies can use to migrate Notes application data to

Exchange; Mailbox Converter, which moves Notes applications and cc:Mail archives to Exchange; Connection Agent, a coexistence and synchronization tool; and MESA Application Exchange, which automates the migration of Notes application data and business logic to Exchange.

"We found that 95% of Notes applications can be migrated and hosted on Exchange with little to no additional work," said Eric Schultz, MESA's CEO.

Microsoft and Lotus have been locked in a fierce struggle atop the messaging marketplace and have battled hard to recruit users of legacy cc:Mail and Microsoft Mail systems. Helping to ease the pain of migrating from old mail systems to new ones is seen by industry experts as a key to Lotus and Microsoft winning new accounts. Schultz said about half of MESA's 20 employees will be absorbed by Microsoft. ■

NET INSIDER

An absence of referees

For a couple of hundred years, scientific truth has been filtered by the status quo.

In almost all scientific arenas, research

results and new ideas have been exchanged by people in like fields and communicated to the general public through what are known as referred jour-

nals and conferences. Submitted papers typically are reviewed by colleagues who are active and well-known in a specific field. The reviews are designed to ensure the papers are clearly written, present conclusions that are well-supported by evidence and do not repeat earlier work.

In most cases, the content of the papers is kept secret or at least distribution is

heavily restricted until the journal is published. Some journals, such as *The New England Journal of Medicine*, refuse to publish papers that include content that has been disclosed — even if it has been disclosed at a scientific conference.

This process has resulted in a deliberate dissemination of highly believable information. This has also resulted in an information dissemination pace that's determined by the process of producing and distributing paper-based publications. Also, the information tends to be filtered by a review process that resists new ideas that threaten the status quo, unless the ideas are extraordinarily well-supported.

But as with many long-established processes, the Internet is becoming a threat to the traditional method of disseminating information about scientific discoveries. Paul Ginsparg, a physicist at the Los Alamos National Laboratory, in New Mexico, has established a Web site (xxx.lanl.gov/) to bypass the usual scientific publication process.

The site, supported by the U.S. National Science Foundation, bills itself as an "e-print archive" — an automated repository for papers. Individuals can submit papers for publication, where publication consists of making the **Scott Bradner** papers publicly available, and update them when the individuals wish to do so. The site is open to the public and covers the areas of physics, mathematics, nonlinear sciences, computational linguistics and neuroscience.

This site has ignited quite a controversy. The peer-review publication process is felt by many researchers to be a critical tool in the fight against quack science and, in some cases, outright fraud. But many other researchers think the peer-review process slows down the dissemination of important information and is too resistant to new ideas.

The controversy has been brewing in scientific circles since Dr. Ginsparg opened his site in 1991 and is now getting wider attention, thanks to a *New York Times* article appearing April 21.

It can be very hard for an individual to distinguish sloppy science from careful science or fraud from reality. But that is what modern communications are forcing more people to do.

Some parts of society are trying to deal with the problem via regulation, but such rules can be of limited help.

Increasingly, we all will be confronted with the need to evaluate the truth of assertions where we have no way to do so. Sometimes the future is not fun.

Disclaimer: Harvard's motto asserts truth, but the above observations are mine.

Bradner is a consultant with Harvard University's University Information Systems. He can be reached at sob@harvard.edu.

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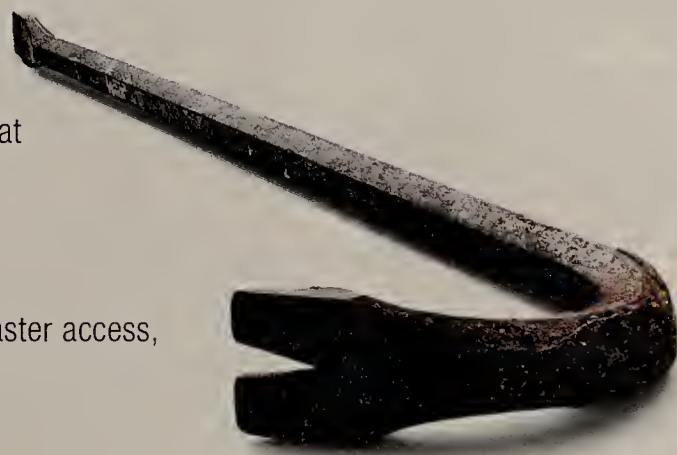
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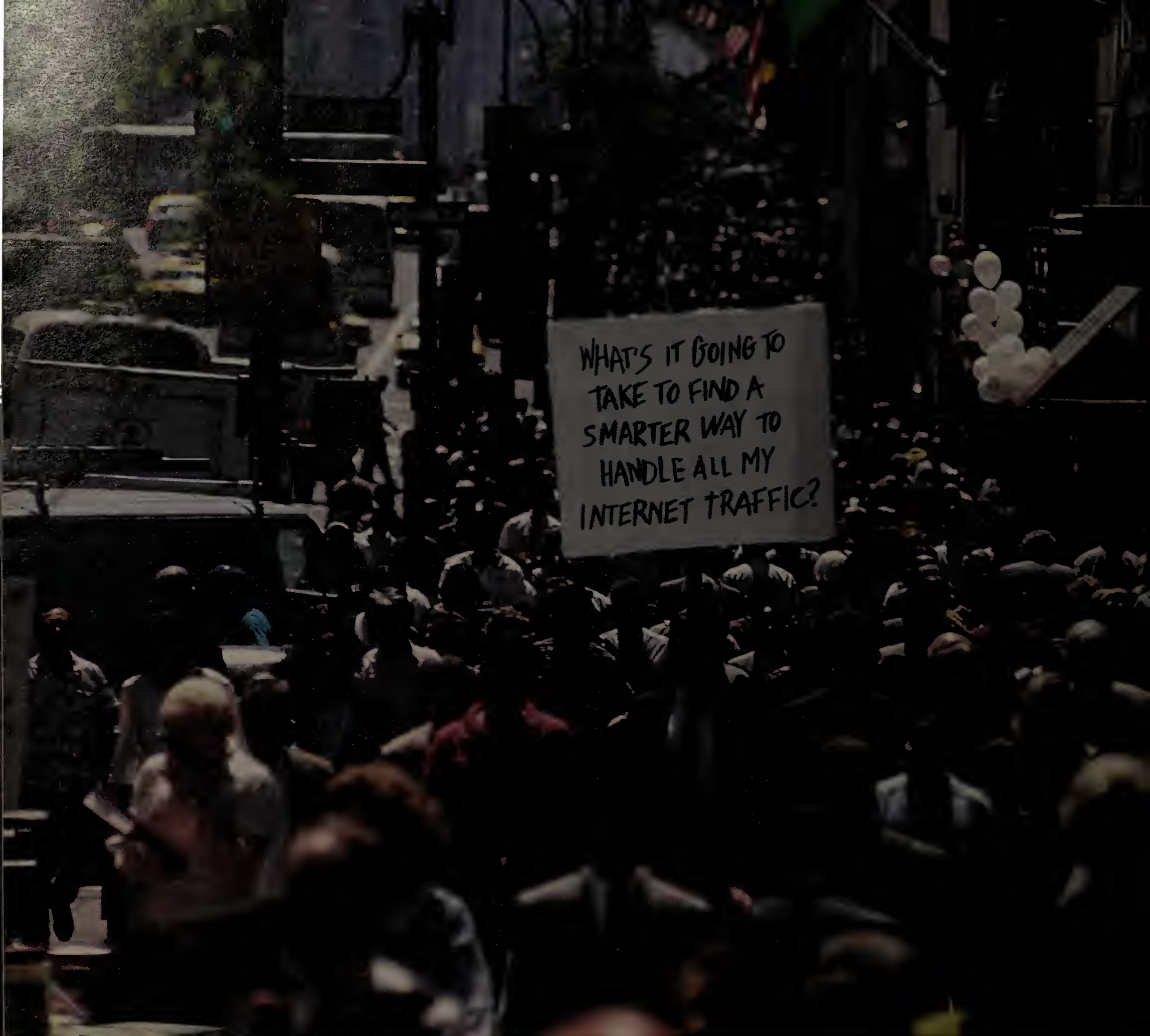
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Technology Update

Covering: Evolving Technologies and Standards

NUTTER'S NETWORK HELP DESK

Ron Nutter, a Master Certified Novell Engineer and Groupware CNE in the Lexington, Ky., area, tracks down the answers to your questions. Call (800) 622-1108, Ext. 7476, or send your questions to rnutter@world.std.com.

We have four NetWare 3.11 servers in four locations connected by a frame relay WAN. Programs are installed on the servers in each office, but the data files are kept in the main office for access by all. However, data access is quite slow in the remote offices. Is there a software package that would synchronize certain directories on all four servers to speed access? We are just talking simple client data files that would only be accessed by one person at a time. I am familiar with Novell Replication Services, and I think it does what we want, but it won't work on NetWare 3.11.

Via the Internet

Until you can upgrade to IntranetWare or NetWare 5 (due out later this year), you have two options. The first involves using your server tape backup software. Computer Associates International, Inc.'s ARCserve software includes a server-to-server copy function. Because this is a one-way conversation, you will need to configure two copy jobs — one for each direction the files will need to be moved. Be sure to invoke the date-checking function to prevent accidentally overwriting a file that is older (or younger, depending on how you look at it) than the one you need to update.

The other solution comes from Vinca Corp., which offers StandbyServer software for backing up NetWare and IntranetWare sites. StandbyServer's WAN edition provides Novell SFT III-like functionality but in a WAN configuration.

Vinca has a good track record in the data protection business and a strong enough reputation that Novell, Inc. currently doesn't plan to bring SFT III to NetWare 5. Instead, Novell is partnering with Vinca to provide that type of solution.

Giving voice a boost in frame relay nets

Linking voice with SVCs lets users lower management costs, get more out of their frame relay networks.

By David Matusow

Frame relay is a network technology that has seen considerable expansion within the past few years. Its ability to support multiprotocol traffic while providing a high-volume traffic capacity at a low cost has been key in this expansion.

Frame relay voice compression capabilities have increased along with the development of the frame relay technology.

In fact, The Frame Relay Forum (www.frforum.com) defines two classes of voice-compression technologies: Class 1 voice, typically transmitted at 32K bit/sec (2-to-1 compression) and Class 2 voice, transmitted at 8K bit/sec (8-to-1 compression). According to the Forum, in order to maximize use of bandwidth, it is possible to carry multiple voice samples in a single frame, further minimizing overhead.

As data flows through a network, it incurs latency or delay caused by the serialization of the data and by overhead of the network protocols.

Voice traffic, because of its sensitivity to delay, can provide a challenge for most network topologies. Although frame relay lessens the overhead of link retransmission, frame relay still requires that the voice traffic cross many physical paths.

PVCs vs. SVCs

However, the concern is that voice traffic in frame environments built with permanent virtual circuits (PVC) will not be as cost-effective as frame nets built with switched virtual circuits (SVC).

PVCs are the underpinnings of today's frame relay networks. These virtual circuits have a flat rate, similar to a leased line. As with leased lines, the connections are cost-effective if they carry sufficient traffic.

PVCs, much like X.25 sessions, provide the appearance and operation of a leased line, but offer a shared access environment. Shared access allows endpoints to be freely connected

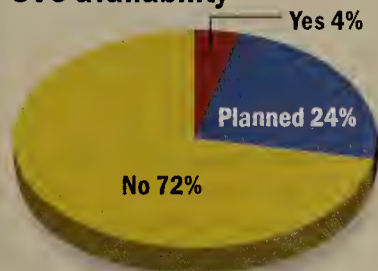
across a frame relay network.

One of the problems with using PVCs for voice traffic is the level of use often does not make this economical. In many cases, voice traffic is sporadic and does not transmit between the same pair of endpoints, making PVC use ineffective and costly.

UP CLOSE Frame relay switched virtual circuits

Frame relay SVCs let users set up a connection across the frame relay network on an as-needed basis. In the frame relay environment, SVCs should let users more easily expand existing frame nets built with PVCs. While SVCs have not been widely implemented because PVCs have been easier to provision, SVCs are expected to become more widely implemented with the growing popularity of frame relay.

SVC availability



Based on responses from 25 carriers

SOURCE: DISTRIBUTED NETWORKING ASSOCIATES, GREENSBORO, N.C.

SVCs provide many advantages over PVCs, including traffic isolation and pay-as-you-go pricing. Each of these makes SVC an attractive alternative, especially when voice traffic is being added to an existing network.

Unlike PVCs, with SVCs, users are able to dynamically allocate the virtual circuit between an arbitrary pair of endpoints on a frame relay network.

When SVCs are paired with devices implementing Frame Relay Network-to-Network SVC Implementation Agreement (FRF.10) technology, users can

connect virtual circuits between endpoints that are not on the same frame relay network. FRF.10 SVC defines how frame relay equipment should establish and terminate SVCs between frame relay networks.

SVCs allow the allocation of virtual circuits for different types of traffic, such as voice.

SVCs:

- Establish temporary point-to-point connections, reducing WAN line charges.
- Provide easier administration, usually requiring administrators to define user logon and access rights from a central location. Contrast that with PVCs, which can require users to define complete end-to-end connectivity definitions across multiple switches.
- Allow better failure protection. SVC users can dial into any ports on multiple nodes to re-establish a failed session. PVCs, on the other hand, need to have all backup links predefined. SVCs can reroute around failed devices if necessary. And if SVC equipment is moved, session traffic can automatically find the new location (provided the device keeps its same address).

SOURCE: FRAME RELAY FORUM, FREMONT, CALIF.

This allows connections that have special requirements to be used without requiring that they be constantly available.

SVCs also provide a way for automatic creation of a path for voice. The path can be created without affecting the performance of other traffic on the link. With isolation from each other, data can be mixed on the line without queuing problems at the packet layer.

Even when conditions are perfect and voice traffic has a clear path, voice transmission can still be problematic. When other types of traffic are added to the mix, queuing delays

occur. If other data is already being transmitted, the voice traffic must be queued for transmission. With other traffic contending for the line, voice traffic suffers.

SVCs do not eliminate all queuing issues, as the flow from the packet level must still be queued to the physical line. The frame window is normally larger than the packet window, allowing more frames to be transmitted before data flow allows the window to be reopened.

Cost savings

Although the per-unit cost of an SVC is higher than PVCs, if it is used less, the actual cost will be lower. This is often the case with on-demand voice traffic.

Advantages can be gained by utilizing SVCs, in contrast to PVCs, in association with voice traffic on frame relay networks. Users should see reduced costs and hear high quality voice with SVCs.

Many vendors, including 3Com Corp., Ascend Communications, Inc., Bay Networks, Inc., Cabletron Systems, Inc., Cisco Systems, Inc., Digital Equipment Corp., Hughes Network Systems, Inc. and Newbridge Networks, are now or will soon be implementing SVC technology. Carriers such as MCI Communications Corp., Sprint Corp. and UNISpan have also delivered or promised SVC support.

Matusow is the chief SNA architect with Hypercom Network Systems, Inc., a network hardware vendor in Phoenix. He can be reached at (602) 866-5399.

Need information?

Let *Network World* provide a quick primer on an important or emerging technology. If you have an idea for Technology Update, contact Michael Cooney at (508) 875-6400 or michael_cooney@nww.com.



Building the next Winchester Mystery House

If you're in San Jose, Calif., with some time to kill, visit the Winchester Mystery House. In the words of the Weird Central Web site, the house "is the product of pure, unadulterated lunacy and is guaranteed to generate stronger feelings of claustrophobia and insecurity than any allegedly 'haunted' house."

The house was owned by Sarah Winchester, heiress to the Winchester Rifle estate. A medium told Winchester she was being haunted by the souls of people murdered with Winchester rifles, and the only way to protect herself from the vengeful spirits was to continually build on to her house. Over 38 years, the Winchester House mutated and grew like some bizarre alien organism, thanks to the efforts of some 50 carpenters who added stairways that lead nowhere, windows that open to walls and additions that are inaccessible. It has 160 rooms.

Where am I going with this little story? Well, I'm wondering if the big network companies—in the San Jose area and elsewhere—aren't building their own Mystery Houses through acquisitions.

Vendors espouse lofty strategies for buyouts, but they're often done for reasons that have little to do with customers.

One reason for a buyout is to keep revenue growing. Wall Street has high expectations for the market leaders, who use their own stock to motivate employees and hire new ones. When sales begin to slow in older product lines, acquisitions can stoke the revenue engine.

Second, buyouts have become a new form of research and development. Rather than commit scarce engineering resources to risky projects, big players can watch the start-ups and buy products that catch on in the market. Finally, buyouts can blunt competitive threats. See something ominous on the horizon? Buy a start-up, and assure customers you'll be a player in the new market.

But each acquisition is an addition to the house. Some fit the original architectural plan, some don't. Some product lines will prove long-lasting, others won't, but the acquiring company still has the people, facilities and overhead from all of the acquired firms. The people living in the West Wing hardly know those in the East Wing. Communication slips, coordination becomes difficult. It gets tough to present a single face to the customer.

For the executives of these companies, the most important skill won't be setting technology vision. It will be keeping these complex mansions from falling into disrepair. Frankly, not all the leaders will demonstrate that skill.

So when you hear about the latest mega-merger, ask yourself: Is the acquiring company really planning for the future or building a Mystery House to keep the ghosts of change at bay?

John Gallant, editor in chief

jgallant@nww.com

Java Break • Ted M. Young

An enlightened approach to opening up Java

In an earlier column I opined that Java seemed to be getting too big for JavaSoft to handle. Judging from its recently announced reorganization plans, Sun Microsystems reached the same conclusion (NW, April 27, page 6).

Sun intends to do away with JavaSoft and its other independent operating units and replace them with seven divisions built around products, technologies and services.

Combining the software product divisions from the former SunSoft and JavaSoft business units into a single division is a good idea. I'm sure I wasn't the only one confused to find that Java Studio is a SunSoft product, while the Java Web Server is a JavaSoft product. However, I would have preferred that the Java architecture and platform, inclusive of the software developer program, were separate from the development tools and desktop software so it could be more vendor neutral.

Part of JavaSoft's problem was that its mission was no longer as clear-cut as it was when Java was first announced. Since then, Java has gone through several of the stages outlined in the Gartner Curve, which is related to the Technology Adoption Life Cycle from Geoffrey A. Moore's book *Crossing the Chasm*. Specifically, Java has gone through the Technology Trigger (its initial release), ridden the hype of Inflated Expectations and slammed into the Trough of Disillusionment. It is now digging out of the trough along the Slope of Enlightenment.

JavaSoft's mission was clearest during those initial stages of Java hype and the resultant backlash. But as more firms began to accept Java and use it to develop products, it was not appropriate for JavaSoft to develop competing wares. That's how Microsoft got in trouble: by creating applications based on the operating system it developed. This gave Microsoft an unfair advantage.

Sun's new Java division will be charged with making sure that all implementations of Java labeled as Java-compliant meet certain minimum requirements. Otherwise, we will lose much of the benefit of Java's being more than a programming language. This is already happening with various implementations of Java-like languages and tools, such as Microsoft's Visual J++ 6.0 and Hewlett-Packard's Java Virtual Machine (JVM).

In order to properly guide Java through its Slope of Enlighten-

ment to the final stage, the Plateau of Productivity, Sun should take a clue from Netscape's decision to move its browser from a commercial in-house product to an open-sourced product. In particular, Sun should provide some way to guide the development of "clean-room" JVMs—JVMs developed without Sun's source code license, or even without the developer having looked at the source code for a JVM. Just as Netscape set up mozilla.org to guide the further development of its browser, Sun should do the same for Java and JVMs.

Having a single source for non-Sun JVMs would enable more effort to go into improving the quality and performance of those JVMs rather than constantly writing new ones. If Sun doesn't coordinate this effort, you can rest assured some third party will, such as the Java Lobby (www.javalobby.org), a nonprofit organization that promotes Java as an open standard.

Sun should not be afraid of an open source-like setup for Java.

The key lies in figuring out what should be open sourced, or at least managed like an open-source project, and what should be put in the category of money-generating products and services.

The reorganization is a useful first step, but Sun needs to put more effort into adding checks and balances to its open process if Java is to be saved from the fate of fragmentation that Unix has suffered.

Young is chief technology officer at Advanced Web Technologies Corp., a Java training and mentoring firm in New York. He can be reached at (212) 487-9064 or at tyoung@javatrain.com. For more information on the idea of open source and its ramifications on the software industry, see www.opensource.org and efforts such as Apache (www.apache.org) and Linux (www.linux.org).

MESSAGE

Send letters to nwnews@nww.com or John Gallant, editor in chief, Network World, 161 Worcester Road, Framingham, MA 01701. Please include phone number and address for verification.

Cabletron comments

After reading your front-page article "Cabletron in chaos" (April 6, page 1), I had to check the masthead to make sure I had not accidentally picked up the *National Enquirer*. The reporting was not anything close to the usual objective style that I have come to expect from *Network World*.

Although the first paragraph alludes to "many observers," none of these observers is ever mentioned by name or even affiliation. Furthermore, the statement that "[Cabletron co-founder Craig Benson only [took] 30 minutes to destroy what CEO Don Reed spent seven painstaking months trying to build: a credible

What we should learn from the AT&T outage

If we measure the magnitude of network failures in user/megabit/hours to reflect the number of users, the capacity of the lost connections and the duration of the failure, the recent AT&T frame relay outage was the worst commercial data network failure in history. Now the question is, what can we learn from it?

First, let's look at what happened. Accounts of the event seem to differ somewhat, but the sense is that a problem with software upgrades in one or two Cisco/Stratacom switches created a problem in the network's topology discovery and management function. This resulted in an inability to route connections and traffic. In effect, control messages sent by the new software corrupted the network.

Is there a lesson to be learned here?

Yes, and it is this: Single-vendor networking isn't as safe and secure as we might like to think it is. In multivendor networks, devices wouldn't be as trusting of control messages received from partner devices — messages like the ones that apparently brought down the AT&T network.

Both AT&T and Cisco should have examined every new module or software element that generated a control message to other nodes. This would have ensured that the network's view of its own configuration and status would not become contaminated and multiplying messages would not overload the devices.

But hey, it all worked out OK because the users had service-level agreements (SLA), right? Not exactly, because there is the catch.

Examine your SLA terms carefully, and you'll see that the carrier is not responsible for consequential damages. That means lost business, lost confidence and lost opportunity.

What is the carrier responsible for? Lost bits. You won't have to pay for the month in which the failure occurred. That's better than nothing, but it's not enough to cushion most businesses from the fact that they were shut down for a day — in some cases completely.

Now let's look at the outage's impact. For many network operators, a one-day hard failure went beyond their worst nightmares. How happy were users with the effectiveness of their backup systems — that is, those who had backup systems? How hard were those without backup really hit?

I asked these questions to 34 users who were affected by the AT&T outage. They had some surprising responses.

Of the 34 users I surveyed, 22 had at least partial data network backup in place. The remainder effectively had no backup. The most obvious question is whether each group felt its decision to have backup or go without was vindicated by the event.

Of the 22 users who had backup, 17 believed that their backup had been effective, and that the reaction of their network and business to the failure had been pretty much as expected. Four users reported that their backup had not functioned adequately, and that they believed further investment in backup network resources would be made as a result of the experience. One user said that his backup had not performed as expected but that the consequences of the failure had been significantly less than predicted. "We didn't get what we thought we would at the network level. But we found out we met our business goals anyway, so we'll stay with what we have," he told me.

Seventeen of the 34 users surveyed said they were rethinking their backup strategies. Yet more than half of this group also admitted that they had suffered no consequential business loss or detectable erosion of customer confidence as a result of the failure.

Furthermore, 15 of the 22 users whose backup had succeeded had no objective evidence that their business would have been harmed had they not had backup. For most, it was a kind of image thing: "We don't think [customers expect] us to go down like that," said one network operations manager.

Almost all of the firms that were sure they had been hurt by the failure used their networks to support transactions that potential buyers might either take to another product source or simply decide not to execute if their preferred supplier couldn't complete the transaction. Examples were a mail-order company, brokerage firms and a health care provider. But even for these firms, the crash was more frightening than actually damaging.

Backup is one of those politically correct things we say we have to have. Do we really know why — that is, what the cost of not backing up our networks would be?

Of the 34 users I talked to, 30 said they didn't really know whether they needed backup or not, in terms of hard business impact. That might be something to keep in mind when we formulate the next generation of network backup plans.

And guess how many of these users said they were going to change frame relay carriers? Zero, because, as one put it, "Nobody else is going to do any better." Maybe that's something to keep in mind, too.

Nolle is president of CIMI Corp., a technology assessment firm in Voorhees, N.J. He can be reached at (609) 753-0004 or tnolle@cimicorp.com.



Get more online:

- A forum about AT&T's frame relay outage and its implications
- Statements from AT&T about the outage



www.nwfusion.com

and stable management team" seems unsupported by any facts in the article. It was my understanding that Reed did bring in a couple of people from the outside but also kept the vast majority of existing Cabletron managers.

The article proceeds in this general vein, making unsubstantiated statements. Examples include: "Benson's power grab" (there is no factual information contradicting Benson's quote on that point) and "key customers were left wondering" (again, the article's only evidence about customer reaction comes from two customers, one of whom states he is taking a wait-and-see approach while the other obviously feels better now that Benson is back in control).

Reporting on a rumor about Cabletron co-founder and Reed predecessor Robert Levine and what he may or may not have

done, without any supporting evidence, demonstrates a total lack of investigative reporting. The statement that Cabletron's stock dropped by 50% and the company reported its first ever quarterly loss since Levine's departure in August, while true, would seem to imply it was Levine's fault. In fact, the stock drop did not occur until November 1997, four months after Levine's departure and after Reed's arrival.

I believe you owe Cabletron and your readers an apology.
Robert Rosenbaum
President
Integrated Strategies
Acton, Mass.

Editor's reply: Network World thought the events surrounding

Cabletron CEO Don Reed's departure were of paramount interest.

We devoted a full week to preparing the story, conducting more than 20 interviews. The resulting article was tough but accurate and reflected the key issues facing Cabletron.

Company officials, though unhappy with the tone, did not complain of a single error. We plan to cover Cabletron just as intensely in the future.

Give it away

In his column "Digital media: New ways to cope with copying" (March 30, page 66), Mark Gibbs suggests that vendors give in to the fact that users are going to copy software and use this knowledge to their advantage.

One approach would be for

vendors to give away the previous version or two of their software. For example, Microsoft could allow users to download Word 5.0 from its Web site for free. People would get hooked on the

Word interface and be more interested in buying Word 98.
Joseph Kimball
PC specialist
Big-D Construction
Ogden, Utah

Teletoons



Phil Frank and Joe Troise babae@sfgate.com

Go online for more

letters about Cabletron and other topics.



I know which buttons to push.

{ The ones that give
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ASSESSING

Switching

BY SUSAN BREIDENBACH

**Layer 3 switching
completes a circle,
giving us pause
to reflect on
where switching
has brought us
and where it's
headed.**

The throngs invading Las Vegas this week for NetWorld+Interop 98 should have no trouble finding vendors hawking Layer 3 switches; in fact, getting away from them may be the problem. ATM had its turn, as did 10M and 100M Ethernet. Now it's routing switches that command the spotlight.

With this development, we've in a sense come full circle — from routing to bridging to switching and back to routing again, given that Layer 3 switching is basically routing repackaged. It seems appropriate, then, to call a timeout and assess this switching phenomenon — to examine how far switching has brought us, where we stand today, where the technology is poised to go and how we're going to get there.

Today's networks are a far cry from what experts envisioned in 1990, when neat and tidy visions of end-to-end ATM connections and voice/data convergence were dancing in their heads. Ethernet switching was just a stopgap that would extend the life of aging technologies such as TCP/IP long enough for the new order to establish itself.

But the visionaries underestimated the inertia of the installed

SWITCHING MILESTONES

1990

Kalpana debuts first Ethernet switch, EtherSwitch

1992

FORE delivers first ATM switch, the ASX 100

1992

Grand Junction announces first Fast Ethernet switch

1993

Berkeley Networks delivers Giga-Switch, the first FDDI backbone switch

1994

Centillion Networks delivers the first token-ring switch

1997

Foundry Networks delivers the first Gigabit Ethernet switch



WHERE WE'VE COME FROM



ew technologies tend to issue forth from agile start-ups unencumbered by installed bases and investments in existing product lines. LAN switching is a case in point. The first commercial Ethernet switch was prototyped in the Silicon Valley garage of entrepreneur

Vinod Bhardwaj, now president and CEO of ControlNet, Inc., a high-speed networking start-up in Campbell, Calif.

Flush from his stake in the initial public offering of former employer Excelan, Inc. (the TCP/IP specialist subsequently acquired by Novell, Inc.), Bhardwaj went out on his own in 1987 with an idea for boosting the capacity of what was then pre-10Base-T Ethernet. LANs were proliferating everywhere. Ethernet's bus architecture was holding things back.

Bhardwaj was working on a three-port device that would replace Ethernet's individual t-connectors when he had a flash: It was not the speed but rather the shared nature of Ethernet that was the problem. The three-port device simplified wiring but wouldn't really scale. The answer was a product that provided dedicated connections to each station and eventually included an uplink to higher speed backbones.

When Bhardwaj pitched his invention to network companies, he was regarded, like many pioneers before him, as being afflicted with moonstruck madness. "They said, 'We've moved on to routing and you're sending us back to bridging,'" he recalls.

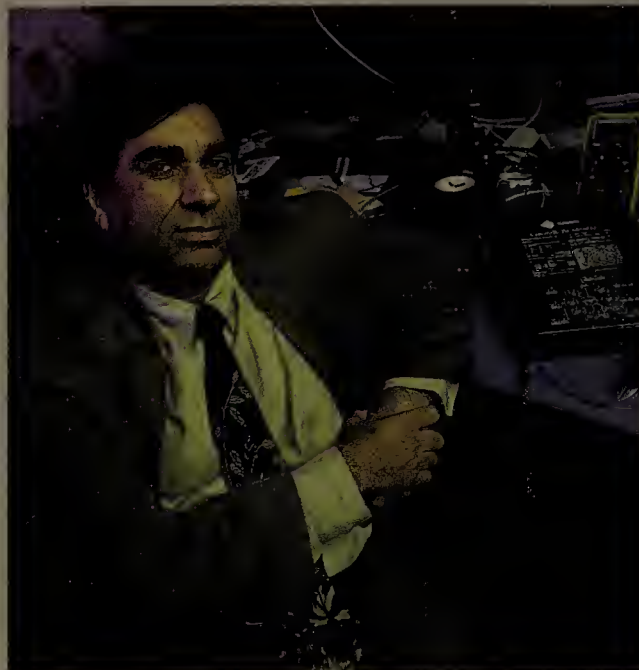
Rejected but resolute, Bhardwaj left the established players to their 10Base-T committee battles and co-founded his own company with Larry Blair, now vice president of marketing for Redback Networks, Inc. in San Jose, Calif. They named the company after Bhardwaj's wife, Kalpana, whose name means "imagination" in Hindi.

The first order of business was to get rid of the "B" word, so the device — really the aggregation of a bunch of bridges — was designated an Ethernet switch. The product, dubbed the EtherSwitch, was encased in a traditional four-cornered box, but Kalpana marketers represented it on network diagrams as circular to make it look different.

"FDDI and ATM were coming out at the same time that we were releasing this 'fancy bridge,' so we promoted it as just tactical," Blair says. Tactical indeed. It turned out to be the beginning of a paradigm shift that would enable frame-based networking to flourish into the 21st century. At the time, however, finding believers wasn't easy.

One well-known network industry executive was offered worldwide marketing rights to the EtherSwitch for \$250,000. "But he turned us down three times," Blair recalls.

The Kalpana team was left to its own devices and in the summer of 1990 rolled out the first EtherSwitch. It had



Vinod Bhardwaj now sits at the helm of start-up ControlNet, but in 1987 he was busy inventing Ethernet switching in the proverbial Silicon Valley garage.

seven 10M bit/sec ports and sold for \$11,500, about \$1,650 per port. However, the price was less of an obstacle to prospective customers than the configuration changes to their networks.

"They were concerned about reliability and introducing a single point of failure," Bhardwaj says. "But once we got in the door, we could demonstrate a very visible improvement to network performance."

In fact, early product reviews characterized the EtherSwitch's speed as "stunning," and sales started to snowball. By 1992, vendors that had scoffed at the concept of Ethernet switching were lining up for OEM deals. Their customers were demanding Kalpana-like technology.

Kalpana passed into history in 1994 when it was swallowed up by router giant Cisco Systems, Inc. Ever the entrepreneur, Bhardwaj left the company three months earlier so he wouldn't have to sign a noncompete agreement.

What does he think about the revolution his EtherSwitch wrought?

"Switching has progressed more than I originally thought, but it has also gotten a lot more complicated," Bhardwaj says. "Switches were throughput devices that were supposed to replace hubs, not routers. You keep them simple, simple, simple. Throw bandwidth at the problem, not complexity."

— Susan Breidenbach

base and failed to learn the lessons of Open Systems Interconnection (OSI). Paradigm shifts bubble up from the bottom like natural ground springs; they aren't imposed from the top. As ATM slowly worked its way through standards committees, the Ethernet cadre rose to the challenge and increased network speed by two orders of magnitude in just seven years. Users started deploying ATM on the backbone, but the availability of a cheap, simple, high-speed Ethernet alternative effectively kept them from extending it to the desktop. And Ethernet will continue to dominate the desktop unless ATM prices come down and demand for ATM-enabled services goes up.

But Ethernet couldn't provide an end-to-end solution, either. While switches enabled the creation of larger Ethernet networks, they couldn't scale across the backbone because of management and spanning tree problems. It was a stand-off until Layer 3 switching entered the picture.

"The advent of the Layer 3 switch is what made frame networks at the core possible," says Basil Alwan, vice president of product management at Bay Networks, Inc., in Mountain View, Calif. "You get one of the main benefits of ATM — you can switch or route equally fast. That has important implications for how you can build networks."

What's in a name?

Switching is one of the euphemisms that abounds in the politically correct 1990s as people use words to evade reality. Layer 2 switches are really multiport bridges, but routing was in, and the "B" word was out when the EtherSwitch was christened in 1990 (see story, this page). Similarly, the "R" word had become synonymous with slow, complex and expensive by the mid-1990s when the first Layer 3 switches — really hardware-based routers — appeared.

When bridging was invented in 1983, it outperformed and displaced the single-protocol routers then being used. But bridges propagated broadcast storms, so they were replaced by multiprotocol routers or put into silicon and called Layer 2 switches. Now routers are out of vogue, so they are being implemented in hardware and referred to as Layer 3 switches.

"Routing is not bad, it just needs to be a lot faster and cheaper," says Drusie Demopoulos, vice president of marketing for Foundry Networks, Inc., in Sunnyvale, Calif. Although Layer 3 switches generally support only IP, Layer 3 routing switches

ETHERNET RULES

Switch sales (In millions)	1995	1996	1997
Ethernet	\$1,102	\$3,061	\$4,723
ATM	\$132	\$402	\$711
Token ring	\$45	\$177	\$142
FDDI	\$48	\$182	\$122

Switch ports (In thousands)	1995	1996	1997
Ethernet	2,022	7,692	20,897
ATM	76	285	492
Token ring	34	218	250
FDDI	13	52	52

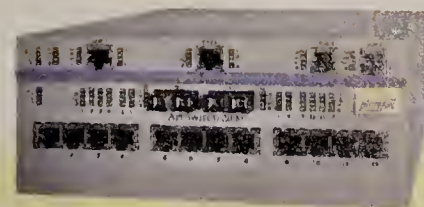
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are an order of magnitude faster than the traditional software-based multiprotocol routers that put Cisco Systems, Inc. on the map. And while a routed 100M bit/sec Ethernet port is priced at about \$750, a port on a traditional router can run \$5,000 to \$7,000.

The price/performance gains from replacing traditional routers with Layer 3 switches are thus much greater than those obtained by moving from hubs to Layer 2 switches. Industry observers think the price difference between a switched and routed port will drop to zero within two years. Extreme Networks, Inc., of Cupertino, Calif., has already announced pricing of \$100 per port for switched and \$150 for routed 100M bit/sec Ethernet.

Currently, vendors are each using their own custom Application Specific Integrated Circuits to manufacture Layer 3 switches. "The next trend is putting Layer 3 switching into standard silicon," says Diane Myers, a senior analyst at In-Stat, a consultancy in Scottsdale, Ariz. "We should see some announcements from the semiconductor companies within 12 months." This commoditization will help to reduce the cost of building Layer 3 switches (NW, March 2, page 39).

Meanwhile, Layer 3 switches can reduce the cost of network ownership by making it a lot easier for administrators to do moves, adds and



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changes. They don't need to know what physical port users are at.

Consequently, "[virtual LANs] are much easier to implement in Layer 3 switches," says Ori Bendori, chief technology officer for LANNET, a subsidiary of Madge Networks NV, based in Tel Aviv. "They are almost transparent."

When creating and managing VLANs at Layer 2, administrators have to track the physical ports and media access control addresses of individual users. At Layer 3, VLANs can be implemented by assigning IP subnets to them.

Prospects for ATM

Given their obvious benefits, nobody really doubts that Layer 3 switches will do well. ATM is the big question mark.

Until the recent emergence of gigabit Layer 3 switches, ATM was the only choice for upgrading core networks. And big risk-averse IT shops still see it as the safest bet — particularly if they are thinking about quality of service (QoS) and voice/data integration. QoS is embedded in ATM technology, and ATM is the telephone companies' preferred WAN solution.

In contrast, "Gigabit Ethernet hasn't really ramped up yet and won't have a solid QoS solution for several years," says John Armstrong, an industry analyst at Dataquest, Inc. in San Jose, Calif. "ATM is a much more mature technology."

But the best technology doesn't always win. Outside of FORE Systems, Inc., it isn't easy to find people who are bullish on ATM. Some say ATM has achieved a critical mass of adoption that will carry it forward, albeit with its growth checked by Gigabit Ethernet. Others are less optimistic.

"Despite record sales, ATM on the campus is doomed," asserts David Passmore, president of NetReference, Inc., a consultancy in Sterling, Va. LAN bandwidth is virtually free once the equipment has been installed because there are no ongoing line charges. Consequently, it makes more sense to over-provision the network than to mess around with QoS parameters.

"ATM had an opportunity and blew it," agrees Brendan Hannigan, an industry analyst with Forrester Research, Inc. in Cambridge, Mass. "It's too complex and too expensive."

Even committed ATM users are feeling beat up by all this negativity. When Chesapeake Energy Corp. in Oklahoma City decided to upgrade its core network with ATM last spring, network supervisor Bryan Sagebiel went to Interop in Las Vegas, eager to attend tutorials and learn more about the technology. But instructors, far from sharing his enthusiasm, were "kind of dogging ATM."

"I don't understand why," Sagebiel says. "I was skeptical at first. I figured, Ethernet is fine, so why spend the money? But since the migration, I think ATM's the greatest thing

IS ATM FOR YOU?

If you are contemplating a core network upgrade, should you consider ATM? Yes, analysts say, if at least two of the following statements apply to your environment:

- You have more than 5,000 users
- You want to deliver video services to the desktop
- You want to integrate voice and data
- You are using ATM wide-area services
- Your campus is already cabled with fiber

WHERE WE'RE GOING

How much faster and cheaper can data switching get? In eight years, switch throughput has gone from 150,000 packet/sec at Layer 2 to more than 50 million packet/sec at Layer 3, and there is no sign that the electronics driving these advances are running out of steam. In fact, recent announcements of terabit-speed switches indicate the rate of improvement may be accelerating.

Every time it starts to look as if the industry might have to go to optical technology in order to increase capacity, electronics makes another leap. The new terabit switches don't even incorporate the latest silicon technology. They use .25-micron silicon — 1/600th the width of a human hair — and .18-micron technology is in the works. Such linear decreases in size translate into a geometric progression in the number of circuits that can be squeezed onto a chip. And the closer together the circuits, the faster they can operate.

"I tend to think there isn't a limit," says Diane Myers, a senior analyst who follows the semiconductor industry for In-Stat, a consultancy in Scottsdale, Ariz.

Six or seven years ago, Application Specific Integrated Circuits ran at 20 MHz and had 20,000 gates, or groups of transistors that implement some logic. Today, .25-micron technology has pushed those numbers to 100 MHz and 500,000 gates, and .15-micron silicon should bump them to 400 MHz and two million gates.

This is assuming chip designers use standard libraries that have been developed at the gate level. While using such prepackaged logic is a lot cheaper than starting from scratch, it wastes a lot of space.

"If they took the design down to the transistor level, they could do 400 MHz at .25 micron," says Donal Byrne, vice president of marketing for Berkeley Networks, Inc. in Milpitas, Calif.

The capacity of the basic materials is just one aspect of switch performance. Throughput can also be boosted dramatically through architectural innovations.

For example, typical shared-memory switches have trouble scaling beyond 30G bit/sec because the ports have to access the memory through a bus. Packet Engines, Inc., of Spokane, Wash., has eliminated the bus and come up with what it calls parallel

access shared memory.

"In a multicast, we put each packet in shared memory, and any port that is supposed to take it does so," says Jeff White, vice president of marketing for Packet Engines. "There is no risk of oversubscribing the backplane — a typical problem for crossbar architectures, where you have to replicate all the packets in a multicast."

Power X, Ltd., a semiconductor start-up in Manchester, England, is addressing this problem and other crossbar limitations with a serial crossbar chipset that has separate matrix, control and application-interface modules. The first set, scheduled for release this September, can be used to build 80G bit/sec switches.

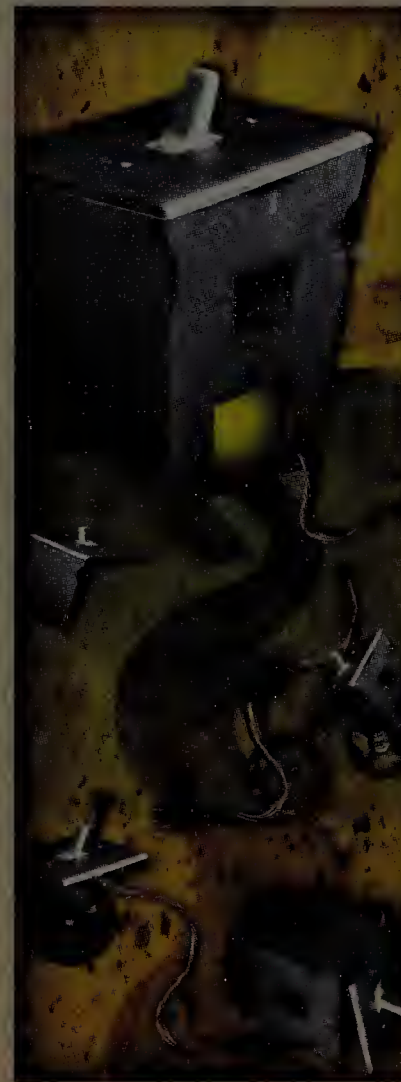
"We have developed a scheduling and arbitration mechanism to eliminate the head-of-line blocking associated with crossbar architectures," says Russell Johnson, vice president of sales and marketing for Power X. He expects the technology to support switch speeds of 320G bit/sec next year using existing software and to scale to the terabit range with more advanced software that's in the works. The Power X chipsets can be used in ATM and Ethernet switches.

If and when the electronics wizards run out of tricks, optical technology presents some possibilities. A 1988 patent describes a 30G bit/sec photonic-array backplane. But that technology emanated from the defense industry, in which checkbooks tend to be a bit larger than the ones available to Gigabit Ethernet start-ups.

"Affordable photonics technology for intelligent switching doesn't exist yet and probably won't for at least 10 years," says Mukesh Chatter, president and CEO of Nexabit Networks, a Westborough, Mass., start-up that recently announced a 6.4 terabit/sec switch aimed at the service-provider market.

One problem is that while electronics have memory, there is no method of storage for photonics yet. "You can do simple switching with devices that use mirrors to move the beams from one path to another, but that's a far cry from true optical routing," says Joe Ferguson, director of marketing for start-up Juniper Networks, Inc., a Nexabit competitor in Mountain View, Calif.

— Susan Bredendbach



since sliced bread."

Infonetics Research, Inc. in San Jose, Calif., recently completed a study of users with high-speed LANs that suggests Sagebiel has plenty of company. The number of respondents using ATM doubled over a similar study conducted the previous year.

The respondents plan an average of 24 ATM backbone ports by 2000, amounting to 22% of their total. "So a lot more people are using ATM," says Mike McConnell, director of LAN programs for Infonetics.

Wrong assumptions

Industry pundits say a lot of ATM's problems stem from the fact that its original objectives are no longer valid. Bandwidth was assumed to be very expensive, so the idea was to micromanage it to squeeze out every drop. In a time of cheap bandwidth, this results in a lot of unnecessary effort and complexity.

ATM was based on the premise that it would go end to end, but it failed to get all the way to the desktop. Consequently, a lot of its services have little utility. Also, the mixed ATM/Ethernet envi-





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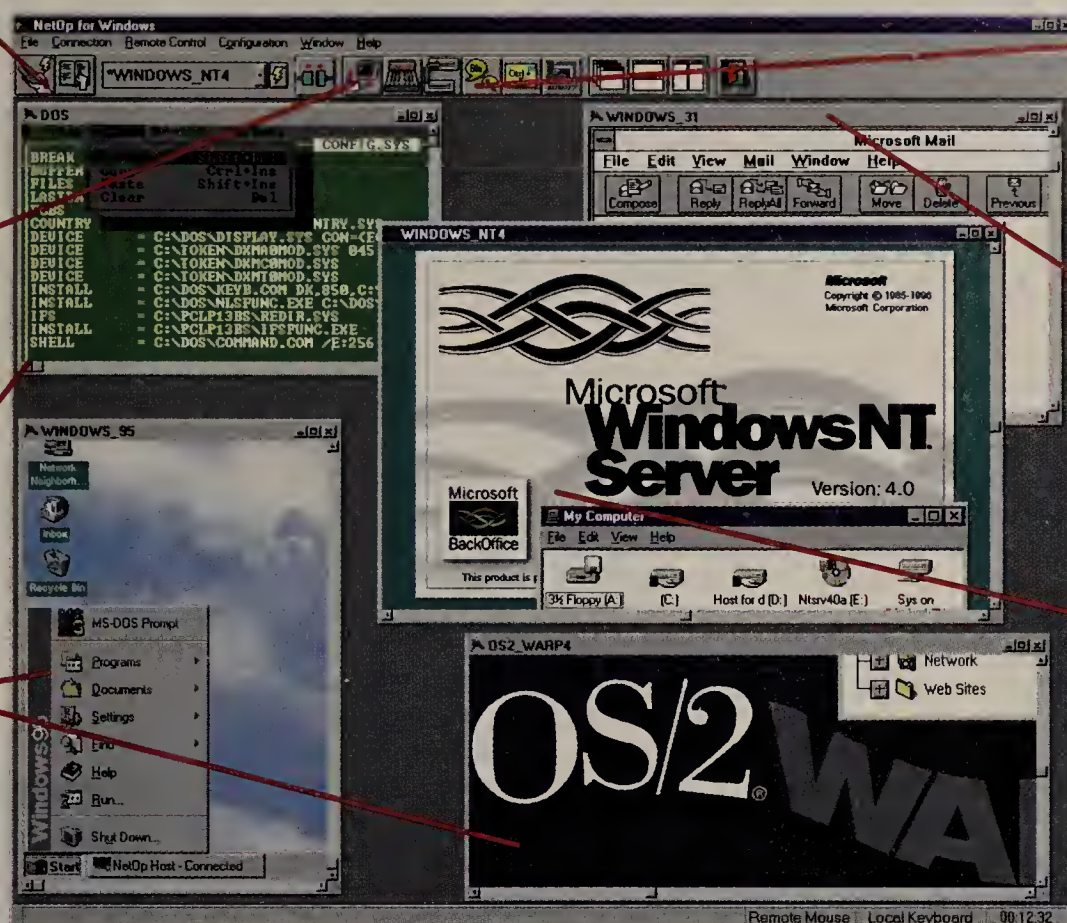
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LAYER 4 SWITCHING: WHAT IT IS AND WHAT IT ISN'T



While Layer 2 and Layer 3 switches use brute force to speed up networks, Layer 4 switching attempts to add some finesse. That's the theory, anyway. In practice, the term has become another weapon for vendors waging a new round of "marketecture" wars.

Such weapons often are labeled with misnomers, and "Layer 4 switch" is no exception. In the seven-layer ISO model, packets are switched either to media access control addresses at Layer 2, the data-link layer, or to subnet addresses at Layer 3, the network layer. So-called Layer 4 switches merely look up into the transport layer of the packet to get information they can use to make smarter decisions about Layer 2 and Layer 3 forwarding.

For example, applications communicate with network services via an object called a port ID number. These TCP and User Datagram Protocol (UDP) port numbers tell the switch what type of application is generating the traffic, and the switch can then map the packet classifications into service guarantees.

In short, packets are just packets at Layer 2 and Layer 3. At Layer 4, there is knowledge about the sequence that an individual packet is part of and the application that generated it.

Traditional routers have had this Layer 4 functionality for years, but it degrades their performance so much that Layer 4 is almost never used. Today, some vendors claim their multilayer routing switches can process Layer 4 information and maintain wire-speed forwarding.

Moving further up the stack enables quality of service (QoS) and policy-based network management so administrators can fine-tune the use of the network with firewall-type granularity. For example, SAP R/3 traffic might be given priority over Web traffic, and bandwidth could be reserved for time-sensitive applications such as voice and video. And security policies can be applied at a much higher level, so hackers can't get in by just finding an IP address.

"What this means is that networks will become more services-oriented, and not just infrastructures for forwarding data," says Mary Petrosky, senior analyst with The Burton Group in Salt Lake City. The services that switches can support will depend on their ability to identify applications, which in turn "is what will separate the various vendors that are making claims about their Layer 4 products," she says.

Primitive, stateless applications such as telnet and File Transfer Protocol transmit on well-known TCP or UDP ports

and are easy to spot. The same is not true, however, for the applications that really need prioritization, such as voice or enterprise resource planning software. These applications are state-dependent and don't have predefined port identifiers. Rather, the numbers get assigned dynamically by middleware, and the switch has to watch the sessions being established.

"You have exactly the same problem in Ethernet and ATM," says Donal Byrne, vice president of marketing for FDDI switch pioneer Berkeley Networks, Inc. in Milpitas, Calif. Switch manufacturers "don't do enough at Layer 4 to make their products useful to these stateful applications, which are the prominent and important applications on today's networks."

Berkeley Networks is tackling this problem by embedding Microsoft Corp.'s Windows NT operating system in its Gigabit Ethernet switch. This gives the platform access to all of NT's built-in services, including the directory, and creates what Byrne calls an "application-aware switch."

"We can take the thousands of network-based NT applications and services and integrate them on top of our platform

according to the needs of our customers and partners," Byrne says. A separate policy server is not necessary. NT provides the translations between the applications and the hardware — a process that can take place at a relatively slow rate as long as the switch is doing the forwarding in hardware at wire speed.

"It's a neat idea, and it may enable Berkeley to implement policy-based networking before any other switch

manufacturer," says David Passmore, president of NetReference, Inc., a consultancy in Sterling, Va. Meanwhile, the big network companies are trying to lock customers in with announcements of their own architectures.

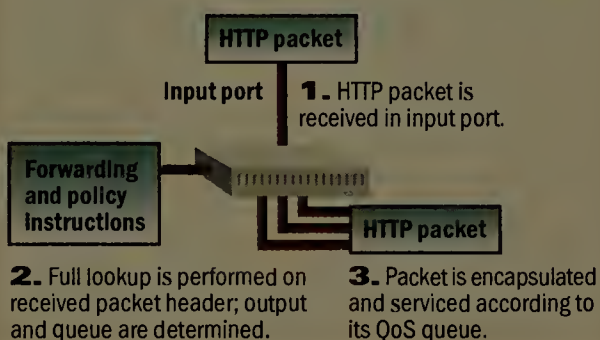
But all that's in the future. For now, Layer 4 switching seems to be a solution looking for a problem.

"Policy-based management? Most network administrators are still racing around on jet-powered skates troubleshooting," says Lynn DeNoia, director of consulting services for Strategic Networks in Rockland, Mass. "And people who are good at troubleshooting are not necessarily good at seeing things in a larger context and figuring out appropriate policies."

— Susan Breidenbach

BERKELEY NETWORKS SHOWS POWER OF LAYER 4

An embedded NT operating system helps the Integrated Network Services switch maintain application awareness.



Calif. Network managers had to run around manually configuring every desktop and endpoint. PVCs worked with Private Network-to-Network Interface's (PNNI) predecessor, the Interim-Interswitch Signaling Protocol. Administrators had to configure by hand each switch's address and the hierarchy of the switch interconnections — local address, group address and path to the backbone.

This didn't sit well with people who were used to broadcast LANs, in which you plug a device in and it automatically learns where everything is. The newer ATM equipment can do this as well, thanks to PNNI and other autoconfiguration features.

"You still have to do the LANE configurations and set the network up to run IP, but it's getting much better," says Hans Baartmans, a Unix

network administrator at Texas Instruments, Inc. in Dallas, who has been working with ATM off and on for seven years.

Moves and changes are also very easy. "The FORE 3810 is the simplest system I've ever had to configure," Chesapeake Energy's Sagebiel says. "I plug the cards in, and it knows how to configure the VLAN. If I

Once a skeptic, Bryan Sagebiel of Chesapeake Energy now says, "ATM's the greatest thing since sliced bread."

want to go from 155M to 622M bit/sec, I just change the cards and quadruple the bandwidth over the same fiber."

Chesapeake's mission-critical campus network has dual redundant paths to all the buildings. "You can't do this with Ethernet — spanning tree shuts one down," Sagebiel says. "But ATM inherently likes redundant paths and does load balancing across them. The failover of services is extremely fast."

The ATM camp is hoping there will be some price/performance improvements in the fourth generation of ATM switches that is being developed.

"There are more silicon vendors working on chipsets, so they should be cheaper," says Ashok Madanahalli, product-line manager for ATM internetworking products at FORE in Pittsburgh. "OC-3 to the desktop starts at \$400 per port now. And Microsoft's Windows 98 is going to ship with FORE drivers."

That sounds like a lot to Ethernet users, but it's actually a bargain if you do the economic analysis right, says Phu Dang, manager of computing solutions for Shell Exploration & Production Technology Co. (EPTC) in Houston.

Shell EPTC installed a FORE ATM network a year and a half ago to support more than 400 engineers and scientists engaged in energy research. It has an OC-12 backbone and OC-3 to all of the Unix workstations and some of the PCs. PCs that can't support 155M have to make do with switched 100M bit/sec Ethernet instead.

"The hardware is only 20% of the total cost," Phu says. "Things like troubleshooting and upgrading — that's the real cost. If high-speed



DOUG HOKE

ronment results in segmentation and reassembly overhead that can't be tolerated in environments supporting compute-intensive applications such as imaging and simulation.

There also was a notion that fixed cell sizes were needed for switching to be efficient and cost-effective, but silicon advances changed the equation. "And frame switches are proving to be faster than cell switches, so ATM might yet lose

out in the WAN," NetReference's Passmore says.

But a lot of the blame for ATM's bad reputation was earned in the early days, when users were struggling to implement first-generation technology.

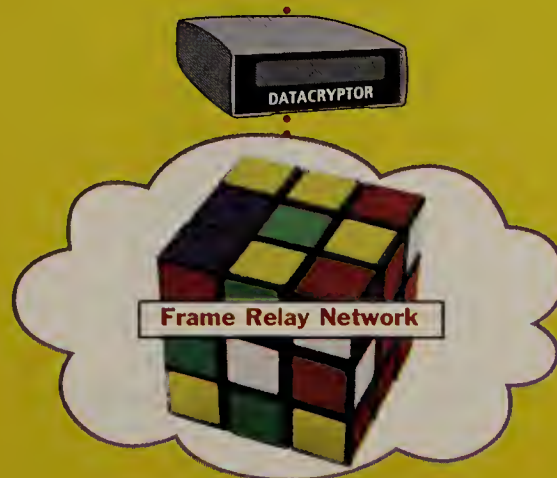
"The older equipment used [permanent virtual circuits] instead of [switched virtual circuits]," says Richard Sweatt, director of marketing for Hitachi Internetworking, a division of Hitachi Computer Products America, Inc. in Santa Clara,

A LITTLE PUZZLED OVER HOW TO BEST SAFEGUARD YOUR FRAME RELAY NETWORK?

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networking is essential to what you do, ATM is the obvious solution."

ATM's future on the LAN hinges on the changing application mix and price points. Basic business applications today don't justify the cost. But that equation could change if time-sensitive applications start to proliferate and ATM prices drop enough.

Whatever happens, ATM has made a major contribution to the art of computer networking. It has focused people on the problem of QoS and on the notion that the network needs to help applications more, not just transmit data.

Winners and losers

ATM has a lot in common with token ring. Both are connection-oriented, offer superior technology and are getting clobbered by the brute force of Ethernet. But we aren't likely to see gigabit token-ring switches comprising enterprise backbones.

For one thing, ATM and token-passing FDDI have complemented token-ring LANs nicely, reducing the need to develop High-Speed Token Ring technology. Also, token ring isn't a contention technology like Ethernet, so there are no collisions that can be eliminated by switching to the desktop. Consequently, token-ring switches have been used largely to aggregate hubs.

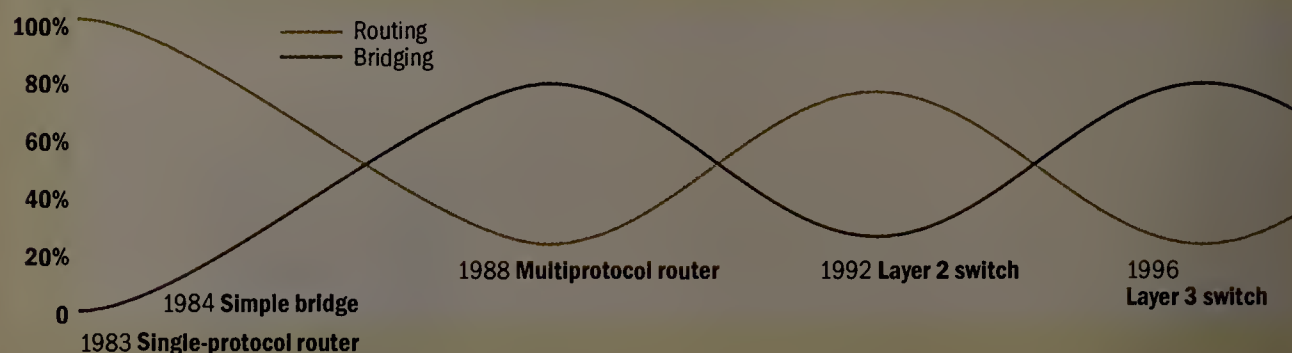
However, switched-port prices (\$250 to \$275) are now getting close enough to shared-port prices (\$200) that switching to the desktop is practical.

"Switches are the one token-ring investment that continues to make sense," says Michelle McLean, senior analyst for META Group, Inc. in Burlingame, Calif.

There are no Layer 3 token-ring switches to date, partly because the existing switches function rather like Layer 2.5 devices. Token ring's source-

ROUTING vs. BRIDGING: AN INVERSE RELATIONSHIP

3Com contends the introduction of each new generation of technology brings a swing in the amount of routing and bridging technology users employ. For example, after multiprotocol routers came on the scene around 1988, companies relied on routing roughly 80% of the time and bridging only 20%, but the roles reversed following the onset of the Layer 2 switch.



route bridging avoids spanning tree problems by allowing for parallel paths in a Layer 2 network. As a result, there is less need for routing — whether traditional or via Layer 3 switches — in token-ring LANs.

"We also don't have as much of a reversal of the 80/20 rule on token-ring networks," says David Olechovsky, chairman of the High-Speed Token Ring Alliance (HSTRA) and token-ring product-line manager at IBM in Research Triangle Park, N.C.

Still reeling from the blow of Cisco's desertion, HSTRA members are regrouping this week at Interop with demonstrations of the first 4/16/100M bit/sec token-ring network interface cards (NIC). At press time, IBM was also planning to show off the first 100M bit/sec token-ring switch.

The next Cisco?

The move from traditional routers to routing switches is the kind of technological upheaval that

creates opportunities for newcomers and threatens the established players. A lot of the best technology is coming from start-ups that hope the move to switching is a big enough paradigm shift to establish a new order.

However, analysts are unanimous on this one: Not a chance. The move from shared to switched Ethernet didn't produce any new leaders, and the current generation of start-ups is fated to get acquired — possibly by telcos.

But the start-ups, as always, are responsible for much of the innovation.

"The big guys are tied to their installed bases and existing products," says Foundry's Demopoulos. "We will always be nine to 12 months ahead of them. There are companies out there that have mission-critical networks and can't wait for the big guys. Those people are our customers."

Incyte Pharmaceuticals, Inc. in Palo Alto, Calif., is a case in point. In 1997, the company's Ethernet network was choking under the load created by genomics processing and other compute-

THE BIG FOUR (OR THREE, OR TWO)

As companies replace routers with Layer 3 switches, analysts expect most will go with one of the four major internetwork equipment vendors. Here's how they stack up:

3Com Corp.

Headquarters: Santa Clara, Calif.

Annual revenue: \$5 billion

Analysts agree 3Com has an image problem: It isn't seen as an enterprise-systems company, and the U.S. Robotics merger probably didn't help. More than two-thirds of the company's revenue comes from network interface cards (NIC), modems and other relatively low-end products. Its Chipcom acquisition brought some high-end switching technology

but failed to provide 3Com with a strong direct-sales channel.

3Com leads in manufacturing expertise, which could be a major factor as routing technology gets implemented in hardware and commoditized. The company also has the best distribution channel and touches millions of desktops with its market-leading Ethernet NICs.

3Com was first among the top four to deliver a Layer 3 switch (the CoreBuilder 3500) and is always pushing the price/feature envelope.

If 3Com delivers on its ease-of-use and management promises, the company should resonate well with users.



Bay Networks, Inc.

Headquarters: Santa Clara, Calif.

Annual revenue: \$2.5 billion

Bay strikes the best balance between direct and indirect channels. The company has the second-strongest channel (after 3Com) as the result of its SynOptics hub background. It also enjoys credibility at the core of enterprise networks, thanks to its Wellfleet router heritage.

However, Bay was an early ATM enthusiast and arrived very late at the Ethernet switching party. As recently as two years ago, company officials were saying customers didn't need a switch module for their Bay chassis. Bay now has a strong entry with its Accellar line, but there's a lot of ground to be made up.

Also, analysts wonder whether Bay has sufficient gravity — it is half the size of 3Com and one-third the size of Cisco — to remain independent. The company finished a disappointing quarter March 28 and may be an acquisition target, with the big telco switch manufacturers being the most likely suitors.



Bay Networks

Cabletron Systems, Inc.

Headquarters: Rochester, N.H.

Annual revenue: \$1.4 billion

Some analysts have removed Cabletron from the top tier, and the company clearly has an uphill battle. Like Bay, the company is experiencing shrinking revenue and posted a \$263 million loss on an 18% drop in sales for the quarter ended Feb. 28.

The resignation of President and CEO Don Reed after only seven months on the job

marks a return to the old guard as Cabletron co-founder and

Chairman Craig Benson takes the reins. Other ongoing cultural upheavals include learning to compete through indirect channels and acquisitions.

Cabletron took a proprietary approach with its SecureFast line and came up with an elegant architecture that made for fast, somewhat pricey switches. The company is now trying to buy itself into a more standards-based product line, as exemplified by the recent merger with YAGO Systems, Inc., a start-up with highly regarded routing-switch technology.



Cisco Systems, Inc.

Headquarters: San Jose, Calif.

Annual revenue: \$8 billion

The switching battle is Cisco's to lose. The networking giant accounts for some 80% of the backbone routers that are targeted for retirement or demotion. However, Cisco is used to making very high margins — about 65% — on this traditional business, while prices of routing switches are falling faster than shipments.



Anxious to protect these profits, Cisco takes a conservative stance on enterprise switches. With its just-announced Catalyst 8500, the company is the last of the four to market with a gigabit Layer 3 routing switch. The official stance includes no mention of replacing traditional backbone routers with such products.

While Layer 3 products put Cisco in a profit squeeze, Layer 4 technology is a different story. Here, Cisco's software expertise can be leveraged nicely as the focus shifts from raw speed to network services.

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intensive scientific applications. Meeting 1998 business goals was expected to triple the traffic to an average of 800 gigabits per day.

"We were a big Bay shop before, but they couldn't meet our needs at the time," says Philip Kwan, manager of network operations and planning for Incyte. Instead, the company upgraded its backbone with Foundry gigabit switches that provide a multibuilding facility with access to supercomputers and big server farms.

Over the horizon

A lot of piloting is going on this year on similar projects, and analysts expect backbone upgrades to go into full swing in 1999. "In two to three years, the core of the network will be routing-switch based, not router based," says Forrester's Hannigan.

The new generation of products has pushed the envelope out enough that bandwidth and prices are not a big story anymore. "We're getting to the point where real value is not bigger and faster but more intelligent and more software-aware," says Fred McClimans, chairman and CEO of Current Analysis, Inc., a consultancy in Sterling, Va.

Get more online:

A story about one of the few switching industry casualties: Ipsilon Networks.

Tolly Group test results. *Network World* columnist Kevin Tolly's company has performed dozens of tests on switches of various stripes. The results are all posted online at The Tolly Group site under the "Industry Studies" banner. You'll also find an archive of articles and columns, many of which deal with switching. It's a registered site, but all the info is free.

Two white papers from network integrator Anlxtar, Inc., one on Ethernet switching, the other on token-ring switching.

Our comparison of switched 10M technology with shared 100M bit/sec equipment.

Our Buyer's Guide to Gigabit Ethernet switches.

www.nwfusion.com

Instead, the focus should shift to incorporating services — directories and firewalls, for example — into the switches.

"The big emphasis will be on prioritization," McLean says. "Not for video or voice, but to make sure that your SAP traffic gets through no matter what else is going on."

Increasingly, management tools should be leveraging directory services. To date, network management has really been device management. "Now you can manage class of service and QoS and align management policies with the particular needs of your business environment," says Clint Ramsay, vice president of marketing for 3Com Corp.'s enterprise systems division in Boxborough, Mass.

In the Infonetics survey of high-speed LAN users, three-fourths of respondents said they would require QoS capabilities by 2000. However, most of them plan to provide it by over-provision-

ing their networks.

While QoS gets a lot of hype from vendors, it doesn't seem to be much more than a check-off item for users right now. "We're not looking at QoS, but rather at using policy-based management to control access to network resources," says

Frank Bielecki, network manager at Sandia National Laboratories in Livermore, Calif.

A number of experts expect this functionality to be provided through Directory Enabled Networks (DEN).

"This is a radical new approach to managing

10 TIPS FOR SUCCESSFUL SWITCHING



K, so you're sold on switching and you want to start deploying. Here are some tips to keep you on the right track from network professionals who have already taken the plunge:

George Ellis, manager of network services at Cognos, Inc., a developer of database technology in Ottawa; Jaimin Patel, regional director of Predictive Systems, Inc., a network integrator in New York; and Paul Mueller, director of networking services at Schneider National, Inc., a transportation services firm in Green Bay, Wis.

Back to basics

Remember, for want of a nail, the kingdom was lost. In the realm of mission-critical computer equipment, power supplies are nails that you dare not overlook. Without power, switches are just very expensive boat anchors, so check for redundant power supplies when you evaluate them.

Hedging bets

When it comes to network capacity, users and applications are insatiable. Overprovision when you buy new equipment, and not just in terms of aggregate bandwidth. Hedge your bets, and buy more features than you need. For example, make sure you get at least four levels of queuing in core switches and at least two in the wiring closet.

Scaling limits

Don't confuse expandability with scalability. Because of the price of Manhattan real estate, some New York-based companies are finding it cost-effective to locate their server farms across the Hudson River in New Jersey. An OC-48 link provides the New York desktops with LAN-speed access. Does the technology you're considering scale to such a level? It may have to.

Skills upgrade

Switching solves some problems for you but can introduce others. The network goes a lot faster when things are working, but troubleshooting takes a lot longer when they aren't. You can't just plug a sniffer into your network and get a quick answer, so the days of using drones who just follow procedures are gone. It's a pretty safe bet you'll need to upgrade the skills of your network staff considerably.

Bigger isn't always better

Don't be overly impressed by vendors that boast about having the biggest, fastest backplane. Some of the really big

platforms are missing a lot of features. Manageability, functionality and reliability are as important as speed.

Trunking traps

There is no trunking standard yet, so the Layer 3 switch manufacturers are creating their own trunking protocols in order to avoid spanning tree problems. This can result in serious compatibility problems and may even preclude multivendor configurations. If you don't want to get locked in to a single-vendor solution, ask about interoperability testing.

Uplink bottlenecks

Be sure to get enough uplink capacity. It doesn't do much good to have a massive backplane that can handle huge applications if you've got a piece of dental floss connecting the switch to your server farm. You may need 5G to 10G bit/sec of bandwidth on these trunks.

Knowledge is power

When planning an upgrade, know your environment, and know it well. Routing and bridging are fairly simple concepts that can get fuzzy when there are too many unknowns. And do a good job of baselining up front. If you want to be able to justify upgrade investments with performance improvements, such baselining is critical.

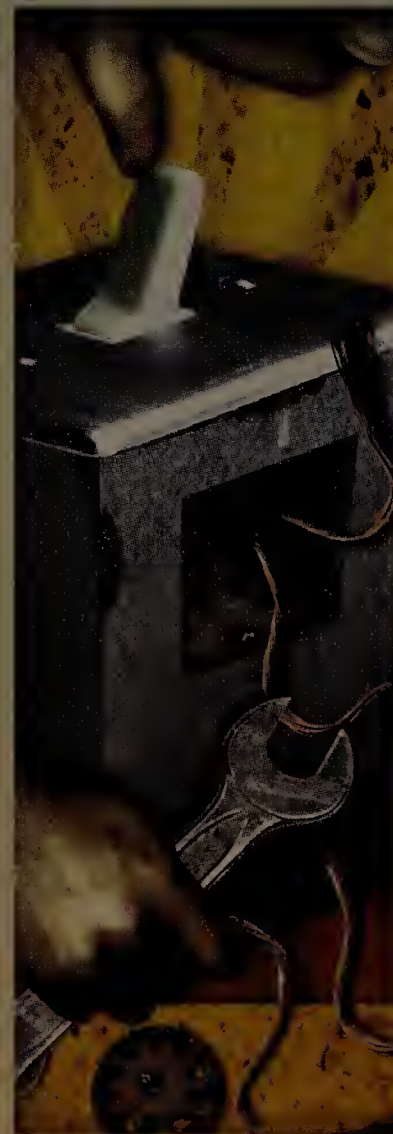
Information overload

Don't be fooled by management capabilities that extract a lot of network statistics. They may simply bury you in mountains of meaningless data. Make sure there are tools that can reduce the data to meaningful information. Don't buy switches that don't support roving port analyzers, and be wary of vendor claims about being able to manage everything from your desktop. Physical location is still very important.

Pilot first and pilot well

Conduct a thorough pilot study before embarking on any major network upgrade. Don't deploy new technology until you and your staff thoroughly understand each feature, including what it does, how it is enabled, what to expect once it is deployed and how to troubleshoot it.

— Susan Breidenbach



bandwidth," says Sam Alunni, a vice president at Sterling Research, Inc. in Sterling, Mass. Policies are established in a single directory that switches can access. The switches provision network resources based on profiles set up for users and applications.

"With DENs, you start to get the same degree of control over frame-based networks that you used to have to go to ATM to get," Alunni says.

Four nines

Networks should also get more reliable as functions are moved into silicon and there are fewer parts. After all, the network component that fails most often is the routing software.

"We will finally see high availability for the masses," says LANNET's Bendori. As this approaches the 99.99% availability requirement of the Bellcore Network Equipment-Building System standard, it will enable business-quality voice over IP and finally unlock the tremendous potential of computer-telephony integration.

Layer 3 intelligence will get more democratic as well. It is expected to spread to the wiring closets and even out to the edges as WAN links go beyond E-I speeds.

"Intelligence is getting cheap, so put it in the closet," says Douglas Hill, co-founder of Xylan Corp. in Calabasas, Calif.

When desktops are attached to Layer 3 switches, all sorts of possibilities open up. These include user-authentication capabilities that enable the network to reconfigure itself based on the identity of the user; end-to-end QoS; and much more granular directory-enabled networking and intelligent multicast distribution.

The Resource Reservation Protocol (RSVP) feature is being incorporated into Microsoft's Windows desktop and needs to talk directly to a Layer 3-aware device if it is to be useful. It is difficult to implement end-to-end QoS via RSVP if there is a Layer 2 device between the Windows machine and the rest of the network.

Full circle?

Vinod Bhardwaj, the inventor of the first Ethernet switch, can see carrying things even further by putting a router at every port and eliminating Layer 2 altogether. Assuming the world converges on IP and silicon prices continue to fall, he thinks it could happen in three to four years.

"Routing is a superset of switching, so it has everything the network requires," says Bhardwaj, now president and CEO of ControlNet, Inc., a high-speed networking start-up in Campbell, Calif. "You would just need a NIC and a router."

Bhardwaj's vision isn't out of the realm of possibility. In fact, it dovetails nicely with the TCP/IP protocol stack, in which Layer 2 is equivalent to OSI's Layer 3 and there is no separ-

ate data-link layer.

First, though, the routers will have to get a lot more intelligent, says Mary Petrosky, senior analyst at The Burton Group in Salt Lake City. Otherwise, the configuration and administration of all those routers would be prohibitive.

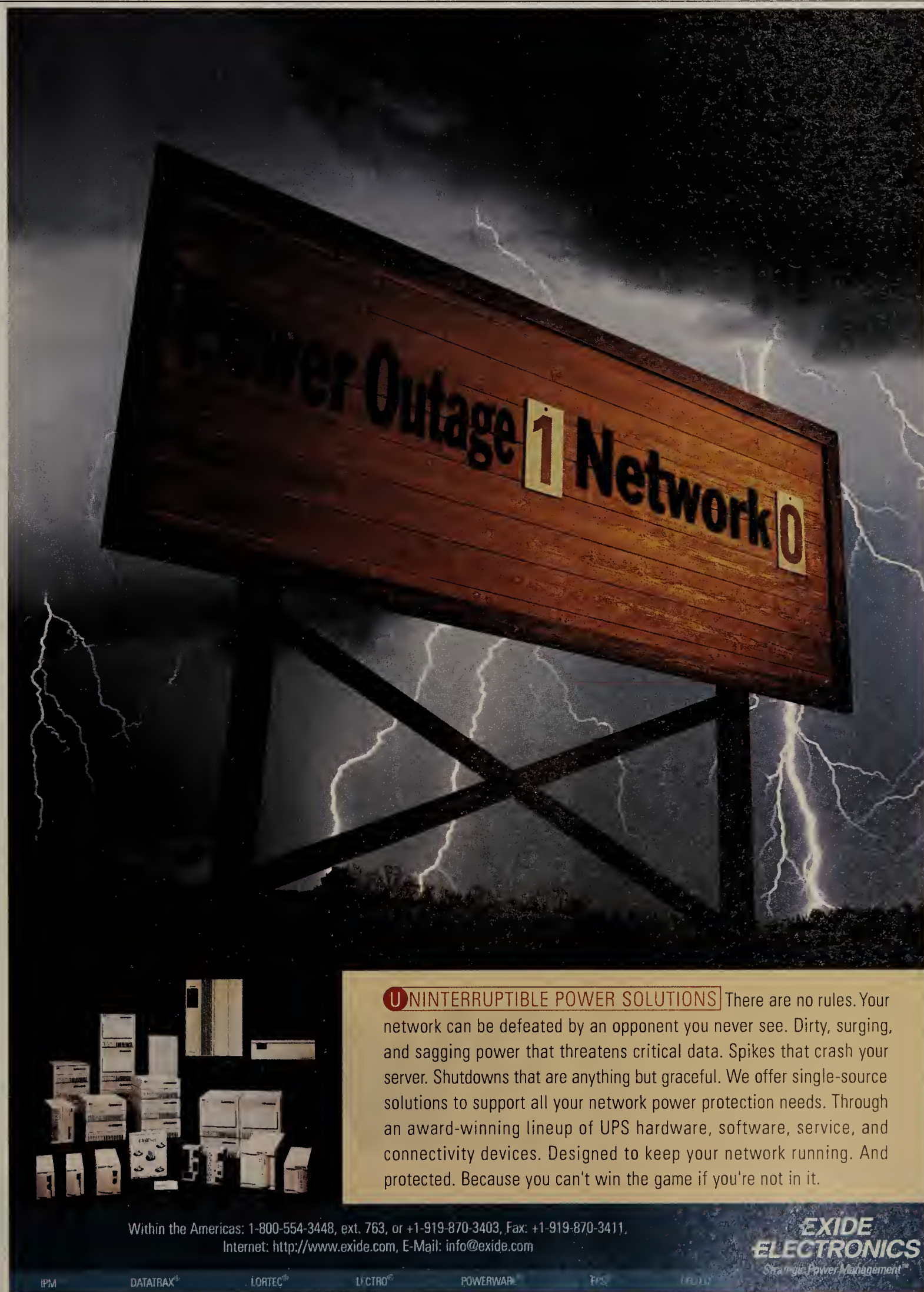
"In ATM, if you have a network with

some 155M switches and you drop a new 622M bit/sec box into the core, they will all find each other and update their tables and learn the new topology," Petrosky says. "Routers don't do that at this point."

Self-configuring routers that can fit into a single switch port at an afford-

able price? They're not exactly on the horizon, but with the speed at which switching has progressed thus far, who would say it can't happen?

Breidenbach is a consultant and freelance writer in San Mateo, Calif. She can be reached at sbreidenbach@usa.net.



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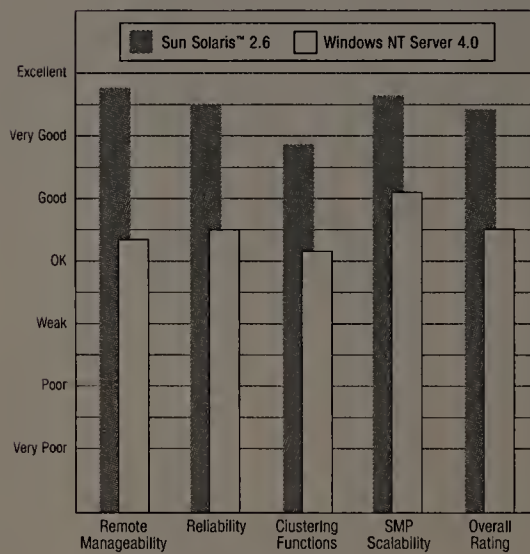
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*D.H. Brown Associates, Inc., March 1998

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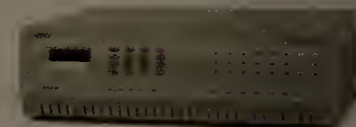
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Carrier capitalization

By Alan Pearce

Merger mania in the telecom industry is finally bringing regulatory, technology and marketplace problems to a head and is ushering in a new age of convergence, consolidation and competition.

The policy and political issues are best illustrated by WorldCom, Inc.'s stunning \$37 billion offer for MCI Communications Corp. WorldCom is the fourth largest long-distance carrier and the nation's biggest Internet backbone provider. MCI is the second largest long-distance carrier and the second largest Internet backbone provider.

The MCI/WorldCom deal, under intense scrutiny from the Federal Communications Commission, the U.S. Department of Justice and the European Union, will prevail because the future of Internet backbones and broadband networks depends upon it.

A big deal

The key to the Justice Department investigation is determining how much power a combined MCI/WorldCom will yield in the telecommunications services and Internet backbone markets.

In a technology-driven business, there are usually two ways to create market power. Suppliers can gain control over enough production capacity in a particular market to unilaterally restrict output by raising prices and profits above competitive norms. Or a firm may innovate highly valued products or services, such as high-speed Internet access, that rivals can't readily provide at a competitive price. By picking up MCI, WorldCom no doubt hopes to exploit both methods.

The MCI acquisition boosts WorldCom's share of total long-distance sales from an estimated 6% to 26%, an increase well in excess of the market concentration guidelines the Justice Department uses to judge potential anticompetitive effects of proposed mergers and acquisitions. The consolidation would make it much easier for the three leading long-distance carriers — AT&T, Sprint/Deutsche Telecom/France Telecom, and MCI WorldCom — to tacitly collude in setting prices. This kind of market concentration raises serious antitrust concerns.

MCI WorldCom's share of the telecom market pales in comparison to its potential domi-

nance of Internet backbones. Together, WorldCom and MCI control about 60% of the Internet backbone capacity, says Robert Blau, vice president of executive and regulatory affairs for BellSouth Corp. Naturally, this too is a big concern for the Justice Department and the FCC.

However, emerging competition may render the dominance issue moot even during the deal review. By year-end, the regional Bell operating companies will begin to provide long-distance service, and Ameritech Corp., Bell Atlantic Corp. and US WEST, Inc. have made it clear they can't wait to get into the long-haul data services market. Perhaps most importantly, WorldCom isn't the only carrier with cash in its pockets and the urge to merge.

Copypat carriers

No stranger to strategic acquisitions, WorldCom built up its network and then rapidly expanded its empire by snatching up companies such as Brooks Fiber Properties, Inc., CompuServe Network Services, MFS Communications Company, Inc. and UUNET Technologies, Inc. Several other carriers are following WorldCom's strategy.

For example, AT&T's proposed \$11.3 billion acquisition of Teleport Communications Group (TCG), the largest independent competitive local exchange carrier (CLEC), mirrors WorldCom's acquisition of Brooks and MFS. At the same time, AT&T is finally beginning to build Internet backbone capacity.

SBC Communications, Inc. plans to break into the long-distance market by acquiring Southern New England Telecommunications,

Inc. (SNET), a carrier serving Connecticut, Rhode Island and portions of Massachusetts. Because SNET is an independent local exchange carrier and not an RBOC, the carrier isn't subject to the Telecommunications Act of 1996 and already provides long-distance service.

Qwest Communications, Inc. is constructing a 16,285-mile fiber network that serves more than 125 cities, and represents 80% of the data and voice traffic originating in the U.S. The carrier also is embarking on an aggressive acquisition strategy. Qwest has made a \$4.4 billion bid for LCI International, Inc. and plans to acquire EUnet International, a European ISP.

Similarly, The Williams Companies is expanding beyond its natural gas business by providing wholesale long-distance service to resellers. The company's 11,000-mile fiber network will grow to 18,000 miles by 1999, and up to 32,000 miles by 2001. The Williams Companies and Inter-

Get more information online:

- Articles on the MCI/WorldCom merger.
- Details about other telecom mergers.
- FCC telecom act.
- Fixing the FCC: A special three-part series examining how the agency can get past its problems and make telecom reform work.
- Stall tactics: A telecom case study on SBC illustrates how RBOCs are thwarting the competition.

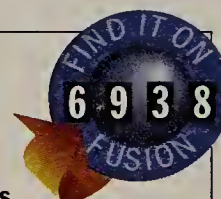
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media Communications, Inc. are planning to provide high-capacity transport for integrated voice and data.

PSINet, Inc. anxious to get its hands into the Internet backbone business, inked a deal with IXC Communications Corp. that essentially gives the ISP 10,000 route fiber miles of IXC's network in exchange for a 20% stake in PSINet.

And Level 3 Communications, Inc., which bills itself as the first national telecom network to use Internet technology end to end, will lease capacity on Frontier Corp.'s 13,000-mile IP-capable Synchronous Optical Network (SONET) for a period of up to five years.



FEATURE

A growing number of cable TV conglomerates are replacing their coaxial cable systems with fiber to join the Internet explosion. Time Warner and US WEST/Media One, Inc. plan to combine their ventures to provide high-speed Internet access via cable modems in 41 states.

Using a similar strategy, AT&T has announced pending investments in @Home Corp. and TCI to pave the way for the nation's largest long-distance carrier to enter local phone markets via Internet telephony.

Finally, there is a growing list of wireless, broadcasting and satellite companies anxious to break the so-called Internet backbone capacity logjam.

A stamp of approval

Since the Telecommunications Act of 1996 was passed, the FCC has suffered major policy, political and business problems. So far, the FCC's policies have been successfully appealed to the circuit courts of appeal and the Supreme Court. Politicians who worked hard to pass the act are increasingly dissatisfied with it. Carriers are still clamoring to compete, while customers want more choices and lower prices. In short, everyone is unhappy, and the act simply isn't delivering.

Deregulation needs to happen quickly. "The market wants it, technology is making it possible, the various industry participants are insisting upon it, while business, government and customers are demanding it," says a senior FCC staffer. "Unfortunately, both policy makers

and politicians confront a schizophrenic dilemma: We cannot back off from regulation until there is competition. Yet we worry that competition will not develop until we back off from regulation."



WorldCom CEO Bernard Ebbers rapidly expanded his telecom empire by acquiring Brooks Fiber, MFS and UUNET.

A senior staff member of the House Judiciary Committee says, "It seems to me that the Justice Department and FCC have only two options: Either require the divestiture of some of the assets of MCI WorldCom, or create more competition in the form of giving the regional Bells more business and merger flexibility."

The AT&T/TCG merger may give policy makers just the break they've been praying for. By approving the merger, the FCC will be able to point to a major global telecom company that wants to make local services competitive. This will give the agency the excuse it needs to give the RBOCs the go-ahead to compete in the long-distance arena. Once this happens, another wave of mega-mergers may erupt.

The Justice Department also is likely to let the

MCI/WorldCom deal go through. "So far, we have not rejected any of the mergers in the industry," says a senior official in the antitrust division, pointing to Bell Atlantic and SBC's acquisitions of other RBOCs, AT&T's acquisition of McCaw Cellular Communications, Inc. and Walt Disney Co.'s acquisition of Capital Cities/ABC, Inc.

"Clearly, I cannot comment on the four major mergers before us — MCI WorldCom, AT&T/TCG, SBC/SNET and Qwest/LCI — but if the past is prologue for the future, you can draw your own conclusions," the antitrust official adds.

The Justice Department is closely investigating the Internet backbone market and attempting to answer a number of questions. Chief among those is the question of ease of market entry and the associated costs, says Phil Verveer, a former FCC common carrier bureau chief who led the Justice Department antitrust action against AT&T in the mid-'70s.

The MCI acquisition will let WorldCom speed up deployment of high-speed networks that are needed to sustain rapid growth of the Internet. To date, such investment has been constrained by the fact that carriers have yet to settle on a pricing mechanism that will compensate them for building the backbone. WorldCom may now have a enough clout in the data network services business to control pricing.

If successful, other providers will follow suit. A rational pricing mechanism for high-speed

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Internet access is key to widespread broadband network deployment because it will shift at least a portion of the wealth being created by the Internet from the computer to the telecom industry. This in turn will improve risk-return ratios and accelerate capital spending.

Considering what Internet growth has meant in recent years to the U.S. computer hardware and software industry, if not the entire U.S. economy, benefits from such broadband network investments could be substantial.

If the Justice Department determines that the MCI/WorldCom consolidation will boost high-speed data network deployment, it could approve the deal on that basis.

Citing a major piece of antitrust legislation, Verveer says, "The standard under the Clayton Act is, 'Is it good for consumers or bad for consumers?' In the event of a tie, the deal wins."

However, that's not to say that WorldCom's plan to buy MCI will clear the regulatory hurdles intact. The Justice Department may be tempted to impose some restrictions to protect consumers and competitors. For example, the combined entity may not be permitted to dump its unprofitable residential long-distance service, and there may be some short-to-midterm regulatory oversight regarding how MCI WorldCom operates as competing data networks evolve.

What the future holds

The major policy issues of Internet and Web access, broadband technology deployment, and competition will continue to shape the telecom industry and business opportunities.

To satisfy the ever-increasing appetite for bandwidth, politicians, policy makers and business experts all agree it should be easy for companies to enter the Internet backbone business.

The major costs involved with Internet back-



MCI and WorldCom control about 60% of the Internet backbone capacity, says Robert Blau, vice president of executive regulatory affairs for BellSouth.

bone implementation include rights of way, fiber and hardware — none of which appear to be prohibitively expensive for telecom industry players.

Carriers need to obtain rights of way from a multitude of sources, including federal and state highways, freeways, toll roads and turnpikes, municipal streets and other roads, railroads, electric utilities, oil and gas pipelines, waterways, and private property. The cost of buying and burying fiber ranges from \$30,000 to more than \$100,000 per mile, including

rights of way. Routers cost roughly \$600,000, although competition is beginning to drive down prices. Lightwave terminating equipment prices are falling too.

An increasing array of businesses are ready to enter the Internet backbone market, including the RBOCs, the CLECs, cable companies, utilities and even pipeline companies and railroads. Emerging competition will probably let the related policy and business questions take care of themselves. These questions will be more effectively and efficiently dealt with by market-based, rather than policy-based, solutions.

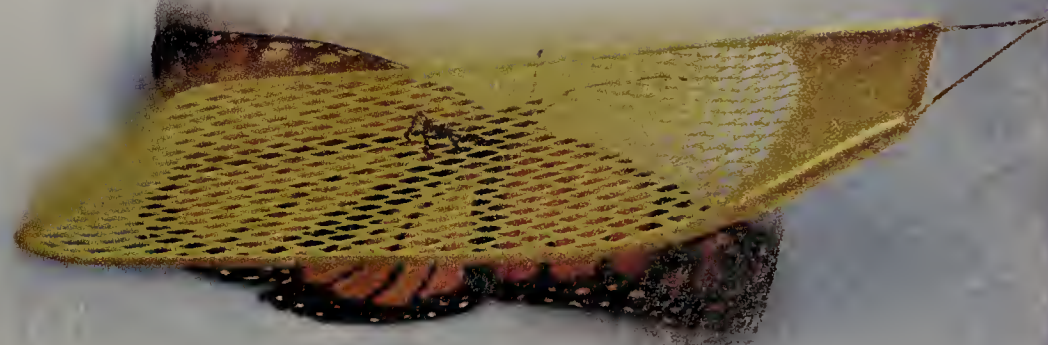
It's also crucial to stimulate the deployment of broadband networks by streamlining regulation or giving companies incentives to build such networks. The FCC is determined to play a critical role in the migration from circuit switching to packet switching. So, too, is the closest of FCC watchers, Vice President Al Gore, who supports the creation of an alternative, less-rigid regulatory regime for providers of broadband, interactive services.

Gore and other policy makers agree that even traditional common carriers may be able to avoid conflicting or overlapping regulatory burdens provided they offer those broadband services and access to their facilities on a nondiscriminatory basis.

Pearce is president of Washington, D.C.-based Information Age Economics, Inc. and is former chief economist of the FCC and the House telecom subcommittee. He can be reached at (202) 466-2654.



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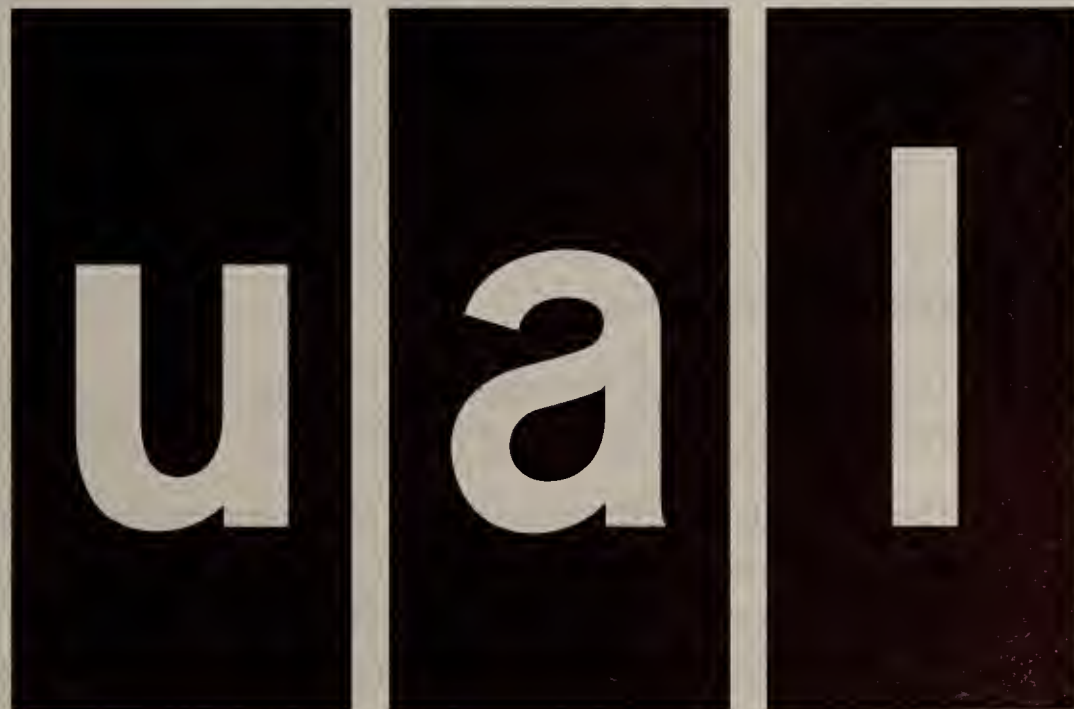
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A small switch with big ideas

By Steve Bell

Hewlett-Packard Co. is attempting to define a new "interconnect" class of switch that's a hybrid between a backbone and a workgroup switch. The eight-port AdvanceStack 800T may be the Cadillac of this segment, thanks to its wire-speed performance, innovative management features and virtual LAN and Layer 3 capabilities.

While the 800T has been out for a while, HP has just begun shipping firmware that includes new management features: a tiny Web server within the 800T's operating system, and a Find Fix Inform (FFI) diagnostic agent.

The Web server lets AdvanceStack users manage the device locally or remotely using a conventional browser. By utilizing the Web interface, you can access the 800T's unusually strong set of integrated management, monitoring and network diagnostic features, including the HP Network Performance Advisor (NPA). The FFI agent is innovative and implements what HP describes as a "proactive diagnostic agent" for small networks.

Performance is an important concern in switching applications and server farm connectivity. The 800T proved to be well suited for either use. We connected the 800T to a NetCom Systems, Inc. SmartBits Ethernet Analyzer and a FORE Systems, Inc. PowerBits analyzer (which is limited to 10M bit/sec). We ran the 800T through two popular test suites: the Network Device Test Lab run on both analyzers and the Advance Switch Tests suites run on the SmartBits at both 10M and 100M bit/sec. The 800T sailed through the tests with 100% of possible throughput and no packet loss.

When we measured latency on the 800T, we verified HP's claim that packet latency is the same for unicast, multicast and broadcast packets — an

attractive feature of the switch's architecture. We measured last in, first out (LIFO) latency at a respectable 3 microsec. LIFO latency indicates how much time the switch spends actually processing the packet vs. propagating it.

Not only is the 800T a good performer, it's also easy to manage via HP's AdvanceStack Assistant (ASA), which goes well beyond the basic element management tools provided with most switches. ASA's base functions include performance monitoring, SNMP alarms and network topology discovery and mapping. ASA exceeds these expected capabilities to provide some powerful traffic monitoring and diagnostic tools.

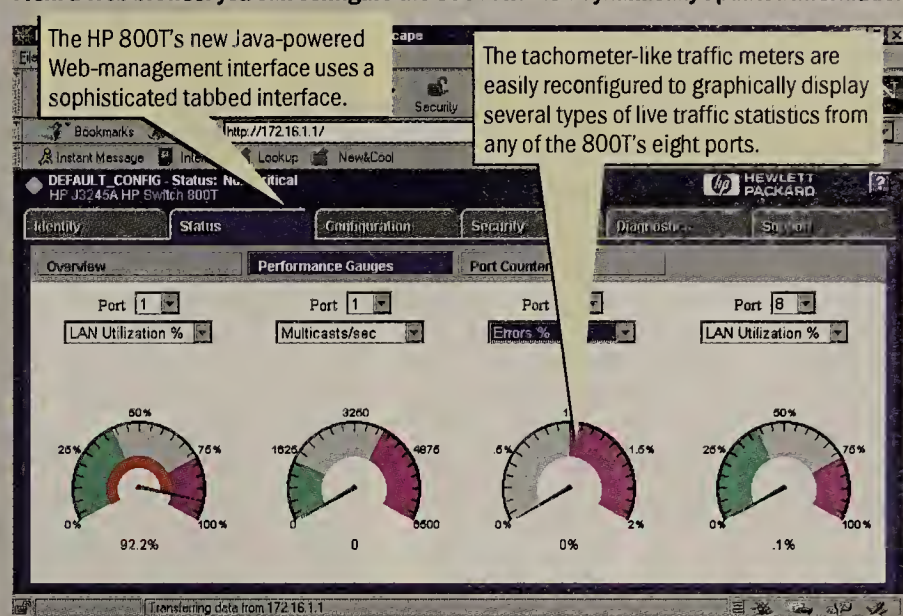
HP's NPA is part of ASA. NPA, based on HP's Embedded Advanced Sampling Environment, is designed to analyze network traffic behavior over relatively long time periods (days or months). NPA can identify inefficiencies in the network configuration and make recommendations to improve performance — for example, by making a suggestion to upgrade the speed of a network segment.

The new integrated Web server enables you to configure and monitor the 800T from any browser that supports Java and frames. HP's Java-based Web management implementation is the best we've seen. It includes all switch-specific graphics and dynamically displays live performance information using meters and bar graphs (see graphic).

In concert with adding Web access to the management tools, HP has added FFI intelligence to the new

HP ADVANCESTACK'S BROWSER-BASED MANAGEMENT

From a Web browser you can configure the 800T and view dynamically updated information.



AdvanceStack software. The new features are there to provide small-network owners with a proactive "stand-in" agent for diagnosing network problems. FFI monitors internal counters such as Remote Monitoring, port and interface statistics. Upon finding a problem, FFI tries to map the

anomaly to a physical problem description and provide troubleshooting recommendations for common Layer 1 and 2 problems. For example, the software interprets normal packets with cyclic redundancy check errors as a "problem cable,"

long packets with bad CRCs as a "problem XCVR or NIC" and late collisions as a "cable-length problem."

While management capabilities are strong, some of the other features are a mixed bag. For example, there is no provision for a higher speed uplink, which is bound to disappoint some buyers.

The 800T includes a solid port-VLAN implementation. Port VLANs associate membership in the VLAN with the physical port location only. Unfortunately, the 800T has none of the more sophisticated address or protocol-based VLAN capabilities that are becoming common today, and there is no provision for upgrading to 802.1Q when it arrives. However, in an area where many vendors stumble, HP did a good job of smoothly integrating the VLAN features into the ASA management GUI.

HP gamely calls the 800T a Layer 3 switch, referring to the Automatic Broadcast Control

Go online for an expanded version of this review plus complete information on both the AST and NDTL test suites

www.nwffusion.com



Score Card

AdvanceStack 800T

Performance (25%)	8 x .25 = 2.00
Manageability (25%)	10 x .25 = 2.50
Features and functionality (25%)	7 x .25 = 1.75
Installation and configuration (25%)	9 x .25 = 2.25
Total score	8.50

Individual category scores are based on a scale of 1–10. Percentages are the weight given each category in determining the total score.

(ABC) and Internet Group Management Protocol (IGMP) features. However, the 800T does not perform wire-speed routing of Layer 3 traffic. The switch does have some Layer 3 intelligence in ABC. ABC listens for Address Resolution Protocol packets

from end nodes, and instead of propagating the ARP, responds to the source with its own version of "ARP spoofing." This serves to lessen broadcast traffic levels in the network.

HP has also bundled an IGMP agent, servicing the TCP/IP LAN Multicast reg-

istration protocol, into the 800T. HP appears to be following Cisco's lead: Cisco embeds its own Group Membership Protocol, CGMP, into its Catalyst 5000 switches. CGMP allows IOS routers to download to a Catalyst switch the identity of multicast clients as they join a

Switches marry Web servers

In addition to the new Hewlett-Packard Co. switches, Web-based configuration and monitoring tools are available from Cisco Systems, Inc. (Resource Manager), Bay Networks, Inc. (Optivity Web), 3Com Corp. (Transcend Enterprise Manager) and FORE Systems, Inc. (CellPath Element Manager), among others.

Many of these Web management implementations require a proxy agent running in a local server or in other equipment from the same vendor. Acacia Networks, Inc. includes the self-contained Java-based NovaWeb Switch Manager, which provides real-time performance monitoring capabilities similar to HP's.

multicast group. Using this information, multicast streams are switched to only those ports interested in the specific multicast traffic.

The 800T also supports port trunking, a nice feature that enables as many as four ports to be trunked together for a high-speed 400M bit/sec full-duplex switch-to-switch connection. The port trunking implementation includes a trunk-failure rollover capability, but HP can't yet handle true load balancing. The trunking is HP-proprietary and not compatible with Cisco's Fast EtherChannel.

We found the AdvanceStack 800T to be a well-engineered product with great support behind it. While the 800T provides IGMP, ABC and VLAN support, it falls short of a full Layer 3 switch in that it doesn't route IP traffic at wire speed. Where HP really shines is with its innovative Web-based performance monitoring and diagnostic tools it is now shipping with the AdvanceStack switches.

The alliance is a cooperative of users, consultants, educators and integrators that applies its technical and business skills to analyze and compare strategic network products.

Bell is senior contributing consultant at The Silicon Valley Networking Lab in Palo Alto, Calif. (www.svnl.com), which provides public and private product performance and interoperability testing services. He can be reached at sbell@bellc.com.

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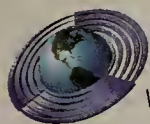
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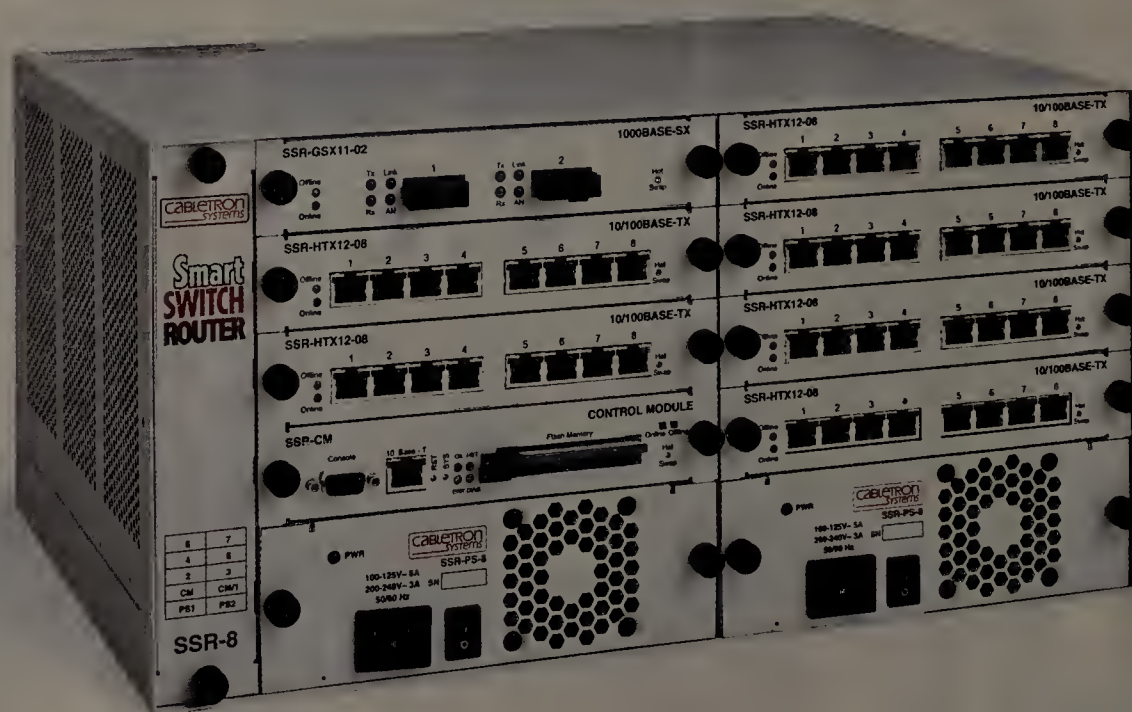
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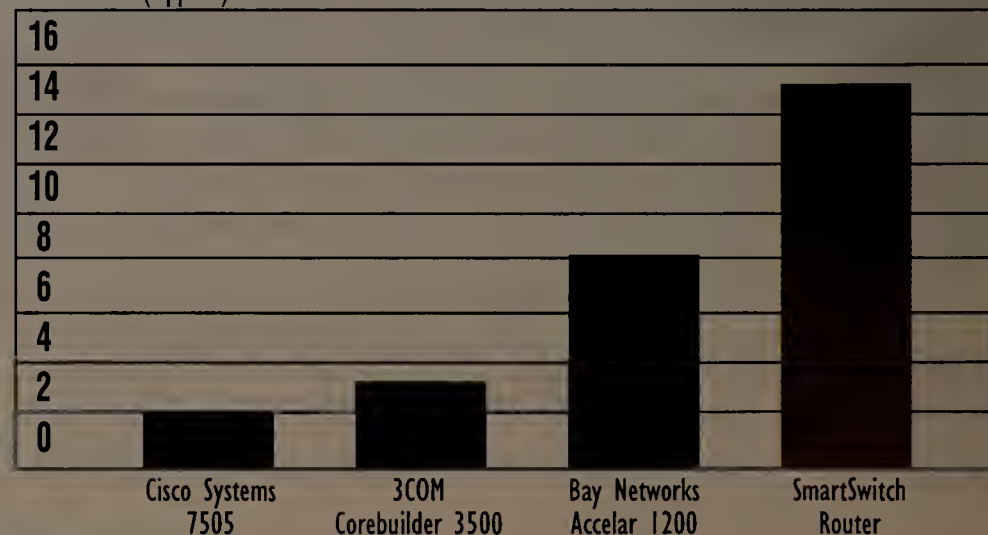
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Amazons, apes and sharks

Encountering movie characters is all in a day's work for the staff of Universal Studios Florida's network services department.

By Loretta W. Principe

Xena, King Kong and the Terminator are just some of the characters Mark McCosh has to deal with every day. No, these aren't code names for troublesome end users, they're his colleagues. McCosh is the project leader of network services at Universal Studios Florida, a movie studio and theme park in Orlando.

Responsible for designing the networks for all of Universal Studios Florida's properties, McCosh also oversees day-to-day maintenance and service, installations, e-mail, Internet and intranet connectivity, and the file servers for the park, all with a staff of three. "We're gluttons for punishment," he jests.

Park guests save their pennies and anxiously await their pilgrimage to the tourist mecca, but McCosh doesn't get nearly as excited about his free admission to the park and complimentary passes for friends and family. He started working with Universal as a vendor even before the company broke ground. He watched rides like Terminator 2 3-D and Jaws go up, and even worked around King Kong's detached head.

Although McCosh insists his IT job isn't unique, it's not as if he's putting on a suit and working at a large insurance company. His employer sells entertainment and ranks customer satisfaction as the No. 1 goal. "It's just like any other job, but more stressful. Anything that impacts guests costs money immediately," he says.

Meeting the guests' expectations has meant planning for exponential growth. In just two years, he's seen Universal grow from a DOS-based NetBIOS network with less than 200 users to a multiple server network with over 2,200 users running Windows NT, NetWare or various flavors of Unix.

McCosh envisioned a switched network as the right medium for mixing exponential growth and a small staff. He kept the network flat and used routers for wide-area connections. The Ethernet and Fast Ethernet network collapses back to a central server farm that houses all the park's servers in one building.

But the beauty of the network is reconfiguration — or lack thereof, says McCosh. "Just unplug and plug," he says. "In a routed environment, you would have to renumber ID addresses in the client." With the flat net, users keep the same address because they are directly connected to the backbone.

Lightning strikes are the biggest problem for Florida's networks. "In the past, we've lost quite a few systems due to lightning," says McCosh. This taught him to wire all building-to-building



Mark McCosh works behind the scenes at Universal Studios Florida so guests can enjoy park attractions like Terminator 2 3-D.

connections with fiber.

Park guests don't care what kind of cable runs through the park — they just want a good time for their money. "We pull all-nighters all the time if a system crashes or if a new system needs to be installed. We don't want to affect the 'guest experience,'" McCosh says. "The park has to look just like it did the morning before."

McCosh's team greets visitors when they first hit the park — virtually. His network runs the ticketing system and turnstiles that ultimately enable guests to enter the park. While each ride's computer system currently stands alone, guests' souvenir and food sale transactions are carried over the network.

Each point-of-sale system has a high-speed link to the backbone. If the main network goes down, each POS system automatically converts to stand-alone mode, an important capability. With an estimated 8.9 million guests passing through the park's gates in 1998, a downed POS system could mean a lot of missed transactions.

The park's rides are self-contained and managed by contractors for Universal's Ride and Show Division. Although not as glamorous as the rides division, McCosh's network extends to each attraction. "We have a system in the rides for e-mail or access for inventory or maintenance," he says.

McCosh will use the same POS systems in Universal's newest properties. Universal Studios

CityWalk opens in the fall and Universal Studios Islands of Adventure opens in summer 1999.

Despite being in the park day in and day out, McCosh says his network is really part of a bigger story — the change in his colleagues' attitudes toward networking. "Two years ago, 260 people didn't see the need for connectivity. Now it's become the lifeblood of the company," he says. Employees use the network for attendance, human resources, financial systems, e-mail, the Internet and the intranet.

"It used to be 'I'll telephone you.' Now it's 'I'll send you e-mail,'" McCosh says. But every silver lining has a dark cloud. "Now if there is a network outage, I hear grumbling."

When people grumble if they can't access a system that wasn't even there two years ago, that's when you know the ride was good.

Principe is a freelance writer and attorney in Springfield, Va. She can be reached at LWP@excite.com.

Watching the skies

Four tornadoes devastated the Orlando area in the early hours of Feb. 22, leaving at least 41 dead.

Universal Studios Florida was lucky. The park was closed, and tornadoes spared the property and the immediate areas. But the tragedy did drive home the point that plans to safely evacuate guests and shut down operations are crucial.

"We track hurricanes on the internal Web and provide updates," says Mark McCosh, project leader of network services at the park. Administrators send periodic updates to employees via e-mail when any storm activity is strong enough to cause hurricane warnings. The intranet is usually updated twice a day.

The intranet is an important component of Universal Studios Florida's disaster and mobilization system, which alerts the park's operations crew, via pager, cellular phone or regular phone to potential danger.

Out of respect for the surrounding communities, Universal Studios pushed back the opening of Twister, a simulator ride based on the movie of the same name. Originally set to open last month, the ride is scheduled to open today.

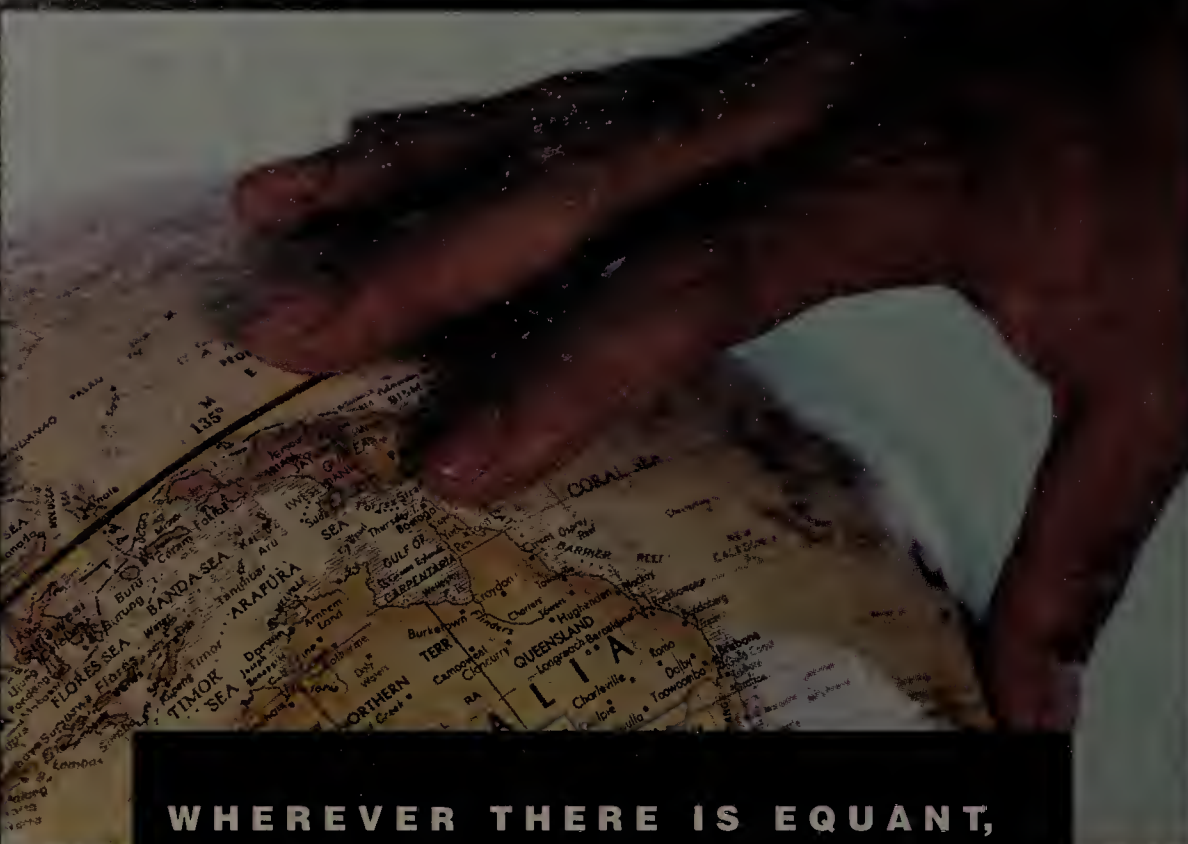
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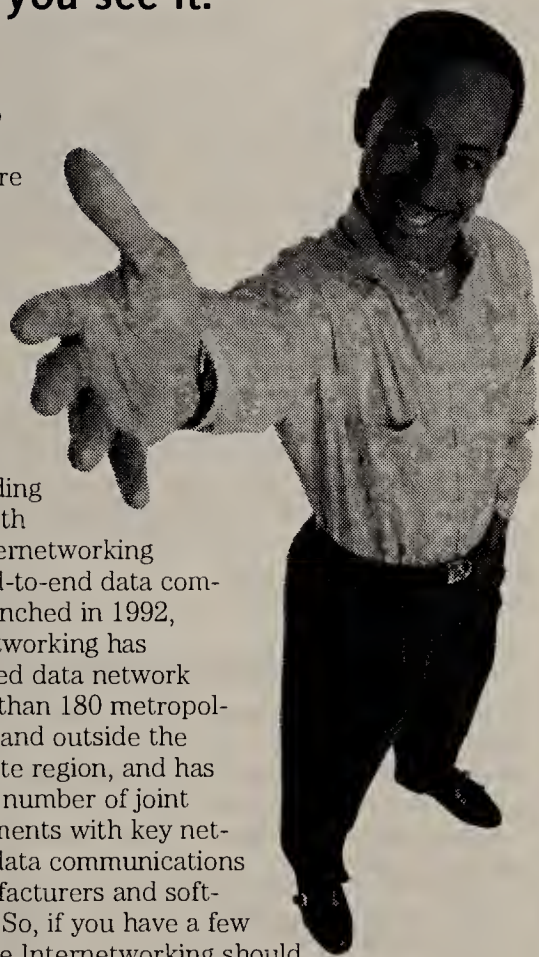
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But there are a few things that haven't changed. We still have an environment that empowers you to think outside the box, to try something new, to contribute anywhere and everywhere you can add value. Our corporate culture has the nimble energy of a startup, with the infrastructure and organization to meet the demands of a larger company.

Look into what you can do with new technologies, new market dynamics and new opportunities. See what's new at Ascend.

Right now we're looking for the following Professionals to join our team:

SALES OPPORTUNITIES – U.S.

*Channel Account Managers
Director of Telco for Western Region
District Managers
SBC-SWB Account Manager
Operation Analyst - Alameda
System Engineers
Territory Account Managers*

MARKETING OPPORTUNITIES – U.S.

*Product Managers
Technical Writer
Public Relations Manager
Marketing Communications Manager
Creative Services Manager
Public Relations Writer*

TECHNICAL SUPPORT – ALAMEDA

*Technical Support Engineers - all levels
Web Technology Manager*

FIELD ENGINEERS - U.S.

*Resident Support Engineers
Quick-Response Team Member
Regional Specialists*

**Please see us at Interop
the Network World Career Fair**

Apply online or send your resume to: **Ascend Communications, Attn: R. Labelle, 1701 Harbor Parkway, Alameda, CA 94502 or email: rlabelle@ascend.com** EOE. To find out more about these and other openings at Ascend, visit us online at:

<http://www.ascend.com>

Engineering Opportunities



Enterprise Networking Systems, (ENS) is a leading systems integrator in the internetworking industry. We provide network integration professional services to Fortune 500 and 1000 companies. We were Cisco Systems' Gold Partner of the Year for 1996 and End-to-End Solutions Partner of the Year for 1997. ENS has also been featured in Inc. Magazine's list of fastest growing privately held companies for the past two years.

Network Engineer

Work at ENS customer sites to provide technical consulting, internetwork design, router configuration, installation, and troubleshooting services. You will participate in the definition of customer requirements, as well as propose and implement leading edge internetworking solutions. You will also have an opportunity to identify new business opportunities and lead in their development. ENS will provide the necessary training and guidance to obtain your CCIE certification.(Cisco Certified Internetwork Expert).

Strong Internetworking/LAN/WAN data communications. 3+ years knowledge and experience with several of the following technical disciplines is preferred: Internetworking devices (bridges, routers and gateways), knowledge of internet firewall and security implementations, experience with LANs: fast Ethernet installations, switched Ethernet installations, Token Ring/FDDI/ATM, Fiber, and Twisted Pair topologies. Strong expertise in WAN technologies also desired: DDS.ADN, packet switched, Network Management Systems (UNIX/NT), Appletalk, Frame Relay, ATM backbone installation, ISDN, CSU/DSU, IDNX and protocol analysis. To ensure success, you will need excellent communication, analytical and problem solving skills. Education: Prefer BSEE/CS, MSEE/CS.

Consulting Engineering Manager

In this role you will manage a staff of highly skilled engineers engaged in multiple projects at multiple accounts and you will have primary accountability for client deliverables. Assist the Sales Account Representatives with technical requirements and estimate man hours into project pricing. Assume a lead role in initial meetings with clients to scope projects and participate in proposal generation and bidding.

Position requires advanced technical project management and design skills. Individual must have experience in the following technical areas: Network Design, LAN & WAN Deployment, Network Management, Network Security, and Network Audits with emphasis on Cisco products. Must possess good business judgment, excellent leadership skills and the capacity to build strong client relationships. At least a BS in IS, IE, EE, CS, or equivalent is required. Major consulting firm experience is highly preferred.

Professional Services Sales Representative

Responsible for selling a full range of network integration and consulting services to medium to large sized companies. Close new accounts and expand existing customer relationships. Gather and evaluate customer network and business data, and recommend appropriate service solutions. Generate and qualify leads (with telemarketing assistance), provide proposals, presentations and follow-up. Also responsible for effectively leveraging the skills of a pre-sales services consultant. Responsible for reaching annual targets in sales and profits. Ideal candidate must have 7 years' sales experience including services. Networking industry and major account experience is preferred. Must be a self-starter and strong closer, with the ability to multi-task and work independently. Need to understand large business organizations and their buying cycles. Must have strong communications and presentation skills, and be comfortable communicating with business executives as well as technical staff. Broad understanding of enterprise application and network deployments is preferred.

The preceding openings are available in the following locations: **San Francisco/Bay Area, Los Angeles/Orange County, Dallas, Atlanta, Philadelphia, Baltimore/N. VA, New York/New Jersey.**

With our company growth, there are unlimited opportunities to learn and take on new and challenging responsibilities. If you would like to be a part of our dynamic team, send/fax resume to ENS, Human Resources, 370 Convention Way, Redwood City 94063. Fax 650-568-0185. E-Mail jobs@ens.com. We are an equal opportunity employer.

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Enterprise Networking Systems, Inc.

Computer Training / VP Technical. The applicant must be able to teach: MS Office, Desktop publishing Operating System (Windows 95/NT, Unix), Programming (Visual Basic), Oracle, Networking and hardware classes. Applicant should be able to: Set up and maintain LAN (Windows NT server/workstation) including remote access. Repair computers, assembly, and installation. Develop specialized sales and administrative tools using MS Access, Visual Basic, Training Partner, and Gold Mine. Applicant should possess Bachelor Degree in Business/Computers. Applicant must be available weekdays, evenings and weekends. Professional appearance and skills. Rate is \$13.50/Hr 40 Hours a week. Applicants send resume to New Mexico Department of Labor: 501 Mountain Rd NE, 87103 Job Order 426687

NETWORKING CAREERS

*For information
about placing
a recruitment
advertisement,
talk to
Network World:*

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(800) 622-1108 x7454
E-Mail:
drabinov@nww.com

Jim Parker
(Southern United
States, and New York)
(800) 622-1108 x7542
E-Mail:
jparker@nww.com

Karima Zannotti
(Northern United
States)
(800) 622-1108 x7488
E-Mail:
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800-622-1108 x7510
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NetworkWorld

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System Engineers

Help deliver this cutting edge product in California, Washington, D.C., and Chicago by providing pre- and post-sales technical support to the service provider market. You'll perform presentations and demonstrations to customers and prospects, and assist in sales proposal generation and RFP response. Requires a BA/BS in CS, EE or equivalent and 3+ years' experience.

Account Executives

Develop new territories in Southern California, Chicago, Ohio, Michigan, New York, Atlanta and Florida while selling the hottest Next Generation WAN access switch on the market. Requires 5+ years' sales experience in the networking arena as well as proven success in account management.

Are you tired of working for a company that only knows you by your employee number? Do you feel like your efforts are not appreciated? Would you like to find a place where your efforts will significantly contribute to the success of a company? Then Assured Access may be the place for you. We design, build and manufacture the hottest Next Generation WAN access switch on the market.

We offer industry competitive salaries and benefits—and stock options. Rush your resume by e-mail: hr@assuredaccess.com; FAX: (408) 941-1818; or send to: Assured Access Technology, Inc., 720 South Milpitas Blvd. Milpitas, CA 95035. We are an equal opportunity employer.



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We currently are seeking senior and mid-level engineers in the following disciplines for East Coast and Midwest positions.

- Internetwork Design
- Network Management Design/Implementation
- Enterprise System Management Design/Implementation
- WAN Design/Implementation

For additional information, please visit our Web site www.rpm.com or mail/fax your resume to:

RPM Consulting, 7130 Minstrel Way,
Suite 230, Columbia, MD 21045.
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- Telecommunications (Experience with Routers, Hubs, ATM, Switching, TCP/IP, SNA, and/or WAN/CPE a plus.)

Ready to do it all? Interested candidates should forward a resume to:

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Attention: Recruiting Department ISDNW98
702 S.W. 8th Street
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Fax: 501-273-6879
E-mail: techjob@wal-mart.com

For more information,
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ALCATEL

We
Are
Where

You Ought To Be

Take a minute to contemplate where your career is and where it's heading. Perhaps your technical skills are getting rusty from working with outdated technologies. Or possibly, limited prospects for career growth and challenge have you feeling "boxed-in".

We'll take a moment and consider a real career alternative—**Alcatel's TELECOM DIVISION!** Supported by 1,300 research scientists and engineers at 12 worldwide development centers, Alcatel's TELECOM DIVISION has attained the enviable position as the world's

leading supplier of telecommunications products and services. Our comprehensive family of high speed products have gained worldwide acclaim for dramatically increasing the flexibility of: **Access (ADSL), Mobile Switching, SONET Transport, Digital Cross Connect, and Network Management.**

If you consider yourself a visionary professional possessing the high-tech know-how to work on sophisticated projects that literally employ some of the world's most revolutionary technologies, then it's time you "got-out-of-the-box" and repositioned your career at the forefront with a global force in telecommunications.

PRODUCT MANAGEMENT

THE FOLLOWING POSITIONS REQUIRE a BSEE or related technical degree and 7-10 years applicable experience.

Product Administrator Specialist - Narrowband Access Products: Manage new product introduction. Experience with digital loop carrier products and Bellcore telephony requirements such as GR-303, TR-57, TR-909 and NEBS necessary.

Local Loop Technology Specialist: Create product plans based on emerging technologies. Streamline current product portfolio. Seek out new product opportunities to increase division sales and profits. Generate business plans/initial requirements documents for products outside of the existing offering.

Product Manager - International Markets: Develop business cases by determining applications, applicable features, competitive strategies, pricing market projections, and selling strategies to expand our world-wide sales of SONET multiplexers and Cross-Connect Systems.

PRODUCT MARKETING

Product Marketing Manager - Digital Cross Connect Systems: As DCS expert you should possess excellent customer interface skills, solid technical product knowledge including networking technologies employed by telcos and service providers (voice & data), superior written & verbal communication skills, and solid marketing skills.

Industry Marketing Specialist: 10-15 years related experience should include in depth expertise in telco or ISP operations and/or marketing/sales to telcos and ISPs for Access Products.

CUSTOMER SERVICE

Network Engineers: Design/implementation of Local Networks products (Lightwave, Digital Cross Connects, Access/ADSL). Interface with Program Management, I&T, Sales, R&D and Product Management.

Field Service/Detail Engineers: Perform site engineering to support installation of Alcatel products. Prior related installation or application engineering experience a plus.

Technical Support Engineers: Provide high level of telephone or on site assistance to resolve customer problems for the Mobile Switching and local networks products. Interest and/or experience in switching technology and signaling protocols.

ATTENTION

Network + Interop CAREER FAIR Attendees
(Las Vegas)

While you're at the Fair, stop by our booth and speak directly with our Representatives. They'll tell you all about our on-going, cutting-edge projects as well as explain all the career paths and advantages available to you.

As a valued member of our worldwide, number one team you will enjoy a highly competitive compensation package and a full array of benefits including 3 weeks vacation for new hires, 401(k) plan (100% match up to 8% of salary) that is literally unmatched in our industry, and \$5,000 per year tuition reimbursement. For those unable to visit with us during the Career Fair, you are cordially invited to E-Mail, FAX or mail your resume to our Staffing Department-NTWCF. Alcatel, 2912 Wake Forest Road, Raleigh, North Carolina 27609. We Are An Equal Opportunity Employer M/F/D/V. Minority candidates are encouraged to apply. A pre-employment drug test is required.

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- Network Support Analysts
- SAP ABAP/4 Support Specialists
- SAP Report Specialists
- SAP Systems Engineers

Stop by our booth at the NetworkWorld '98 Career Fair to find out more about career opportunities.

If you are interested in career opportunities at GTE, but are unable to attend the Career Fair, please send your scanner-friendly resume (plain white paper, standard font and 12-point pitch; no graphics, bolds, highlights, italics, columns or staples) to: GTE, Professional Recruitment, MC: HQW0BA59, Dept. NW/050498, P.O. Box 152092, Irving, TX 75015-2092; or email to: gte.jobs@telops.gte.com; or fax to: (972) 718-3179. GTE is an equal opportunity employer and supports workforce diversity, M/F/D/V.

This winter may have been dismal, but here at GTE, the climate never changed. Hot opportunities year around keep us consistent - as consistent as the outstanding benefits the nation's hottest minds receive: stock purchase options, generous tuition reimbursement, savings/investment plans, pay-for-performance incentives and medical coverage from day one.



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Room N109 directly across the hall from the trade show floor.

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Job Code JF3144 for opportunities in Boston and

Job Code JF3146 for opportunities in Dallas.

Or Mail resume according to location preference.

Boston Opportunities: Fidelity Investments, Job Code JF3144, 82 Devonshire St., Mail Zone H7C, Boston, MA 02109.

Dallas Opportunities: Fidelity Investments, Job Code JF3146, 400 E. Colinas Blvd., Mail Zone CP71, Irving, TX 75039. Or FAX resume to: Boston (617) 476-9996 or Dallas (972) 584-7275.

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Sr. Analog Design Engineer/Manager
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Sr. Systems Engineers
Lead an applications engineering team to provide customer support for network products in production.

MTS CAD Engineer
Support the full suite of front-end design tools from concept to silicon implementation.

Sr. Product Marketing Engineer
Marketing background in Ethernet hubs/switches/routers & related network technologies ideal.

Sr. Strategic Marketing Engineer
Liaison between marketing & engineering to determine business opportunities, strategies, technical positioning & implementation for the next generation of LAN ICs.

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For immediate consideration, please fax us your resume at (408) 774-7024; or you can mail it to AMD, One AMD Place, P.O. Box 3453, MS 935/CMNW5498, Sunnyvale, CA 94088-3453. You can also e-mail: jobs@amd.com. AMD, an equal opportunity employer.

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Network Analysts
NOS Administrators**

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- Product Marketing - Passport
- Carrier IP Services Product Line Managers
- Sr. Manager - Product Marketing
- Passport Product Marketing Manager
- Sales Engineers - Passport (Pre/post tech sales)
- Sr. Product Manager - Network Management

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**See us at the
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- Network Planner
- Internet Thruway OAM Designer
- Access Software Designer
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- Product Marketing Manager
- Sr. Manager - PDN Marketing Operations
- System Integration Manager
- Sr. Product Manager

If interested in a challenging and rewarding data networking position with Nortel, send your resume, indicating Dept. NDNB, position of interest and geographic preference to: FAX: (408) 565-3889; E-mail: datajobs@nortel.com Or mail it to: Nortel, Attn: Data Networks Staffing, 2305 Mission College Blvd., Santa Clara, CA 95054.

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(Enterprise Market)
Locations: New Jersey, New York (NYC, LI), Grand Rapids, Cleveland, Detroit, Oklahoma City, San Antonio, Salt Lake City, Denver

Regional Sales Manager
(Remote Access)
Location: Pleasanton, CA

TECHNICAL SALES SUPPORT

Network Consultants
(Service Provider Market)
Locations: Atlanta, Boston, Dallas, D.C., Denver, New Jersey, Seattle

Sr. Technical Specialists
(IP or ATM/video)
Location: New Jersey

System Engineers
(Enterprise Market)
Locations: Grand Rapids, New York City, Denver, Seattle

Systems Engineer (Remote Access)
(2 openings - E. Coast/W. Coast)

MARKETING

New Jersey-IP Networking
Product Planning Engineer
Product Managers

Pleasanton, CA-Remote Access
Product Manager-PM3
Product Marketing Engineer
Product Manager-VPN

ENGINEERING

New Jersey-IP Implementations
Systems Engineers
(High-end IP based technologies)
Software Designers
(R.T. embedded, OO)
Hardware Engineers
(ASICS for data applications)

Pleasanton, CA-Remote Access
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ISDN Protocol Engineer
Embedded Driver-Firmware Engr

PROJECT/PROGRAM MANAGEMENT

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Project Manager
(FL - implement data networks)
Sr. Programs Manager
(CA - Remote Access)

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customer data networks)

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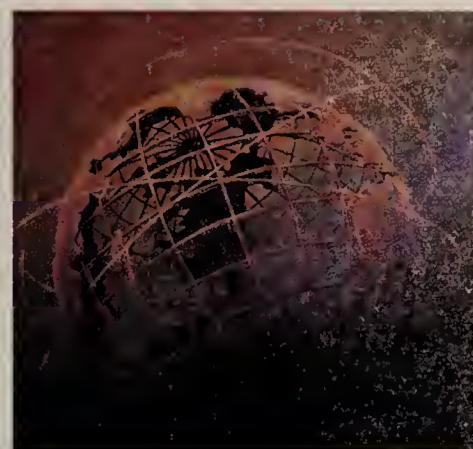
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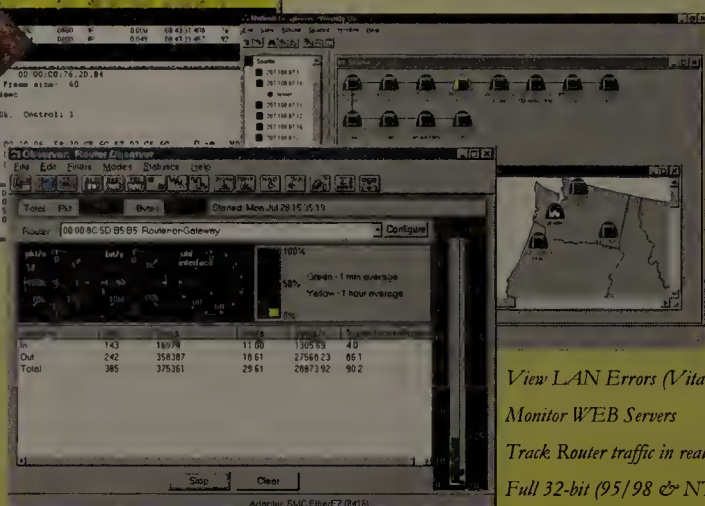
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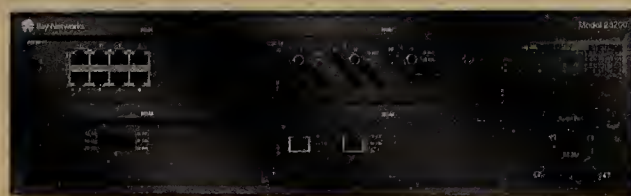
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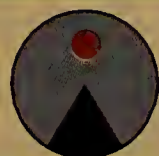
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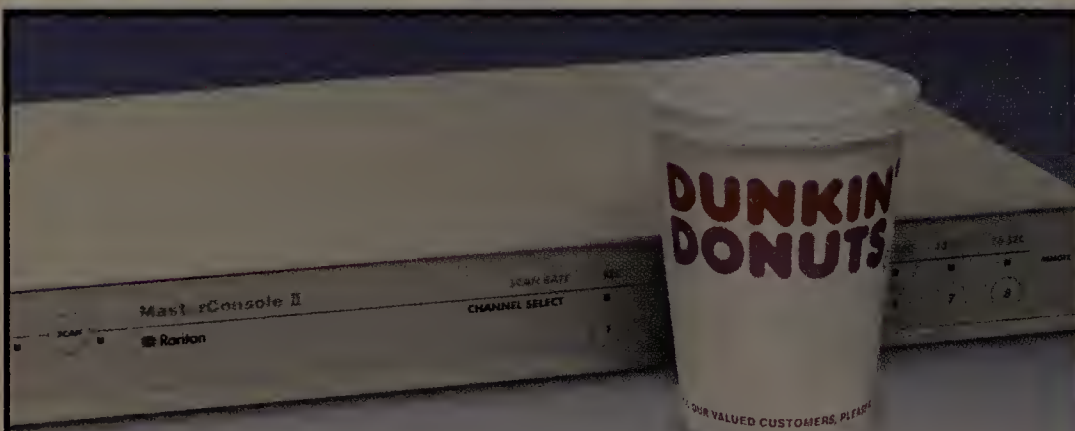
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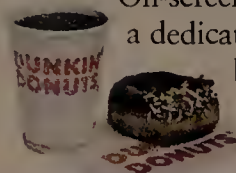
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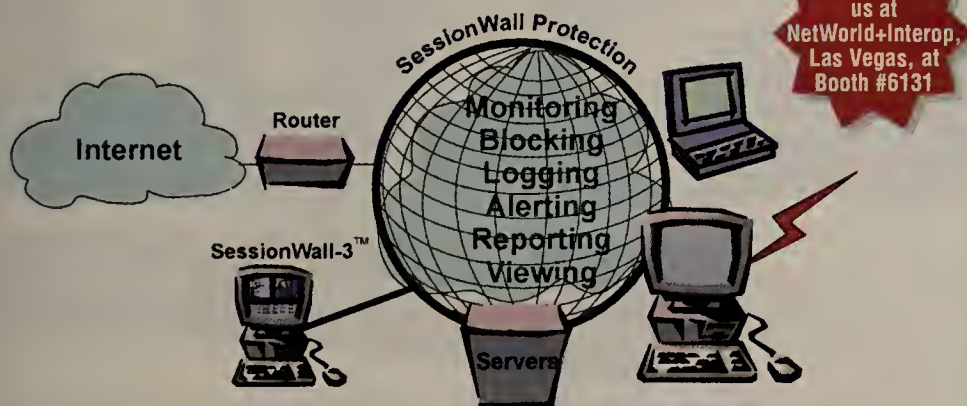
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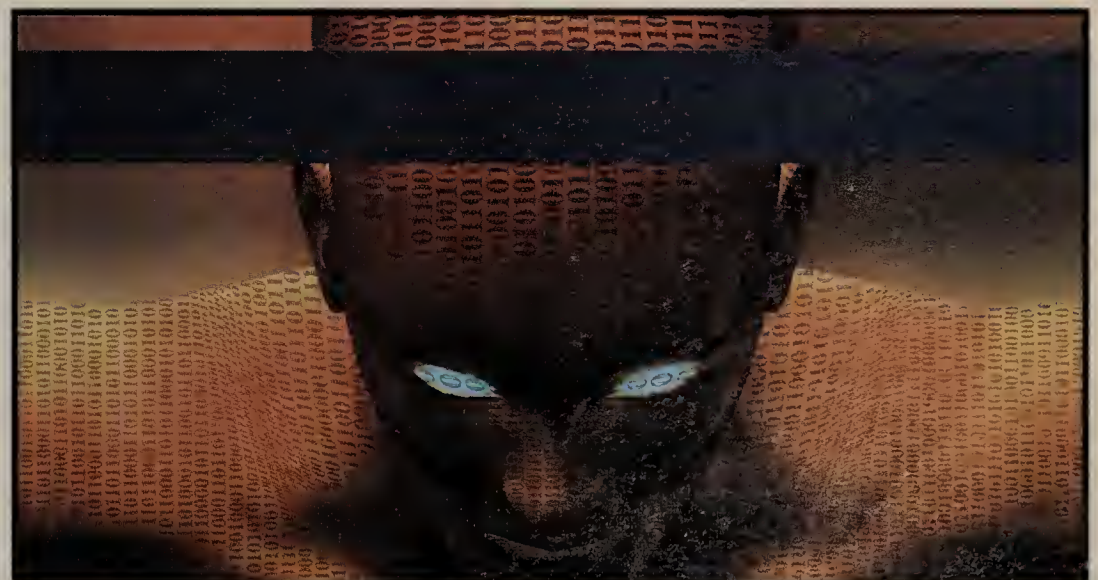
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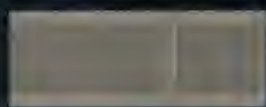
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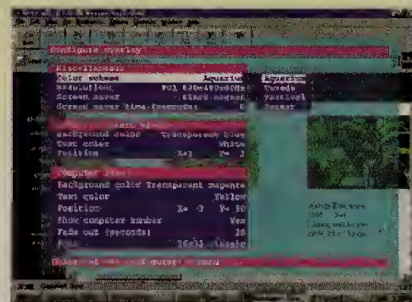
UltraView accesses each CPU from menus that pop up over your existing video. Switch from the keyboard, on-screen menus, front panel, or RS 232 port of the UltraView.

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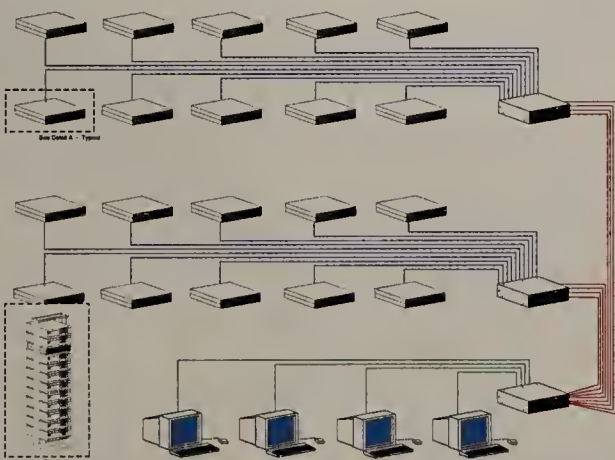
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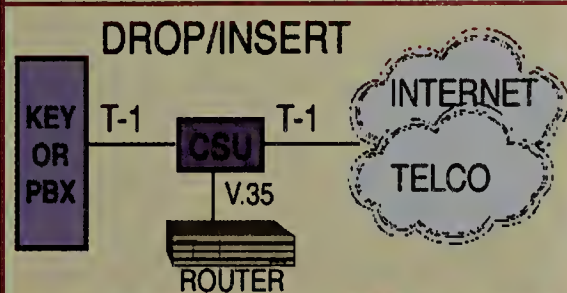
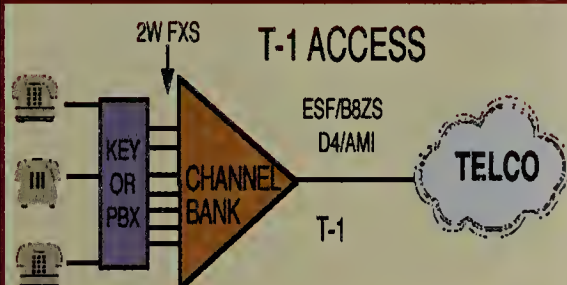
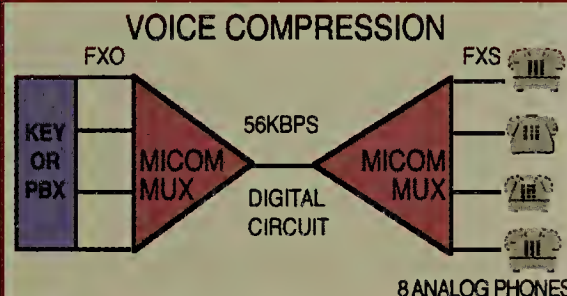
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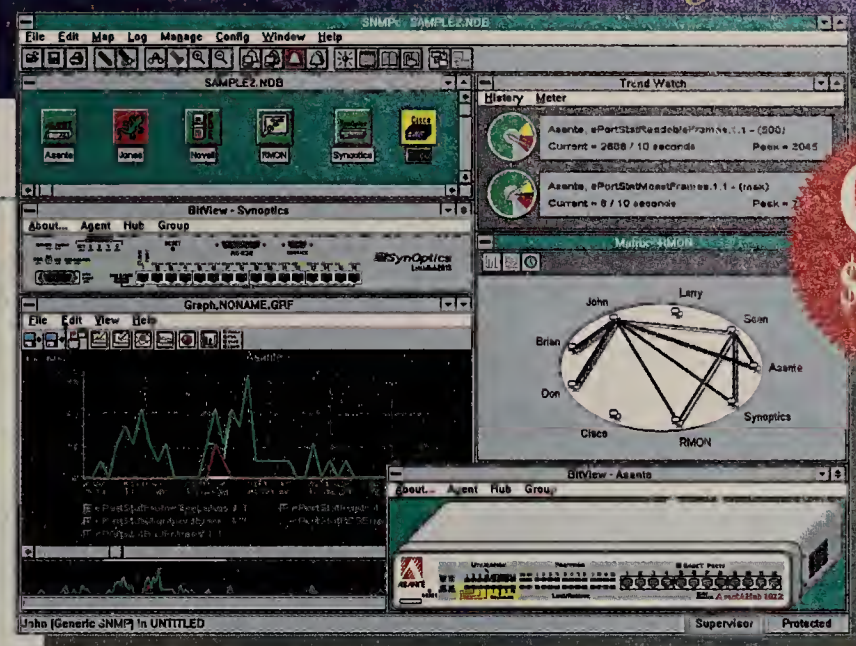
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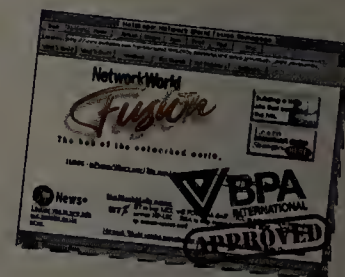
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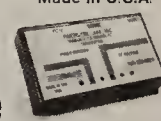
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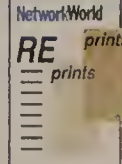
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New products target Windows thin-client nets



By John Cox
Las Vegas

Corporate MIS groups weighing the use of Windows terminals or other thin clients will have

two new offerings to consider this week at NetWorld+Interop 98 here.

One product is a direct rival to Microsoft Corp.'s Windows NT Server 4.0, Terminal Server Edition (TSE), which is a

modified version of NT Server 4.0 that gives thin clients simultaneous access to Windows applications. The other offering is a license management product that works with TSE.

The new TSE competitor, WinCentric Enterprise, is from start-up TekCentric Corp., of Sunnyvale, Calif.

The software installs on a standard Windows NT server and includes client software that runs on PCs. Applications are loaded onto the server, and PC users can simultaneously access them. WinCentric Enterprise displays — via its own Remote Display Protocol — the application's screen on the client.

Windows and NT out first

So unlike TSE, WinCentric Enterprise is not designed initially for terminal-to-server access. TekCentric first will deliver client software for Windows 95 or NT Workstation, but the company plans to add client programs for Unix, DOS, Windows 3.11 and Java users.

Also unlike TSE, WinCentric Enterprise is not affected by changes made to the core NT operating system, according to Chuck Lejsek, TekCentric's president and CEO. Lejsek acknowledged that WinCentric currently offers only a few management utilities to administer the server, but he said the next release will support a more complete management console.

WinCentric Enterprise will cost \$1,295 for the five-user license and \$695 for each additional five-user license.

The company this week will also unveil WinCentric Web, a version of the product

that lets desktop Web browsers launch and run server-based Windows apps.

Sassafras upgrades

Separately, Sassafras Software, Inc., of Hanover, N.H., will debut KeyServer 5.0, a revised edition of the company's license metering application that can discover when a new application is turned on.

KeyServer tracks which Windows software applications are being used by whom and how often. The information is used to block software piracy, to decide the appropriate number of software licenses needed and to determine when users or groups of users should be upgraded.

Designed for Windows and Macintosh PCs, KeyServer is now being tested on TSE, which may support hundreds or even thousands of users starting up server-based Windows applications. The product also works with Citrix Systems, Inc.'s WinFrame software, the technology behind TSE.

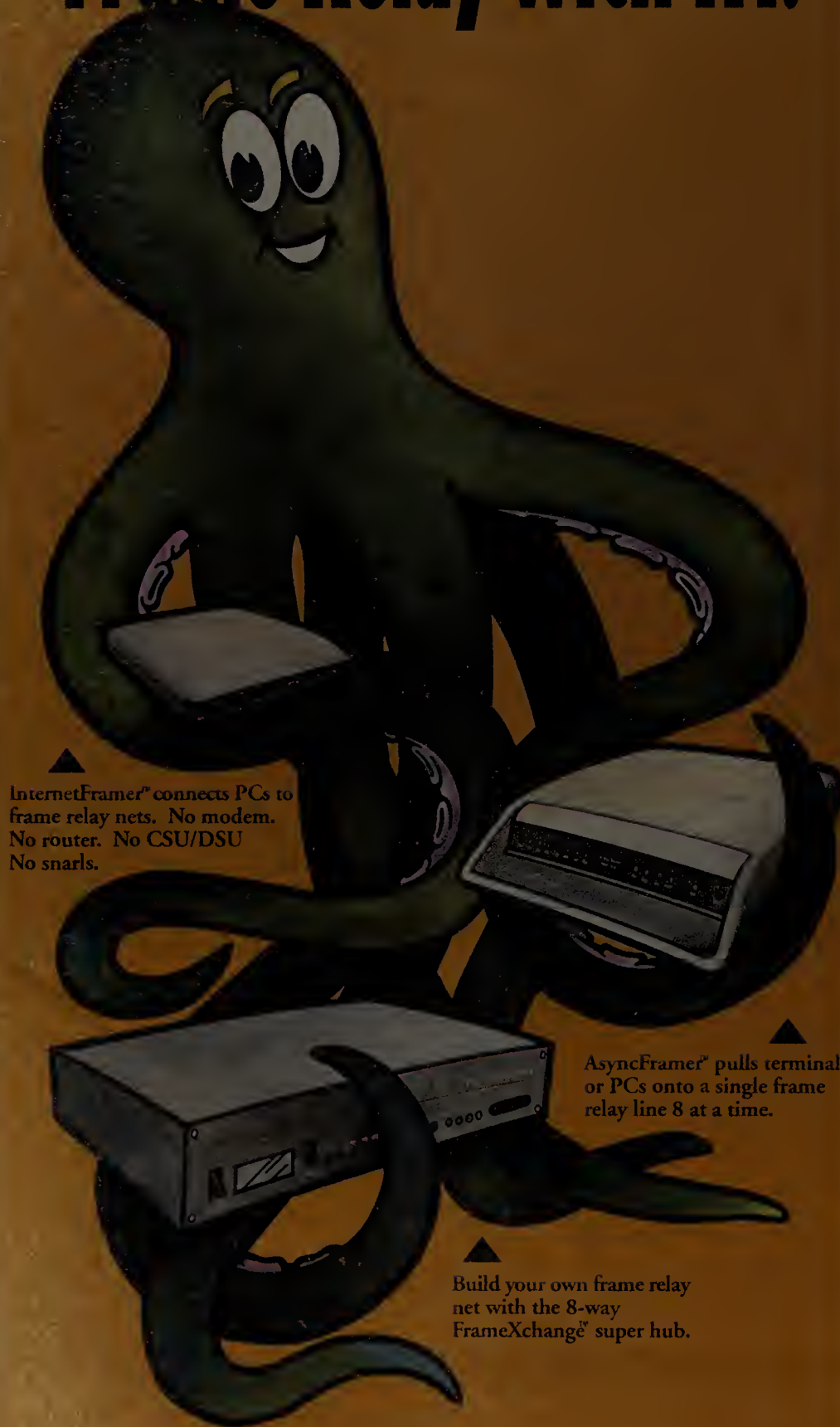
KeyServer consists of a server program, as well as an agent that runs on each client machine. The product works by intercepting the Windows application launching process started by the PC user's mouseclick. The agent checks with the server program to make sure the user is authorized to run the application at that time. If not, the application will not load. The response time is typically 2 to 3 msec.

The administrator can then bring the application under KeyServer's direct control or continue monitoring the application's use.

The software costs from \$30 to \$55 per client.

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Check Point pushes beyond the firewall

By Chris Nerney
Boston

Firewall market giant Check Point Software Technologies, Ltd. last week outlined a strategy and product roadmap that focuses on more than just providing network security.

Check Point CEO Deborah Triant said that over the next year the Israeli-based start-up will add management of IP addresses and directory services to its existing firewall software.

Support for directory services management will be available by the third quarter, she said, while integration of technology from recently purchased IP address software vendor MetaInfo, Inc. is planned for later in the year.

Check Point already offers traffic management through its FloodGate-1 software.

The company also announced the creation of a global technical services division that will offer professional services, technical support and training.

But Triant also said Check Point currently has no plans to support Novell, Inc.'s NetWare or IBM's OS/2 operating

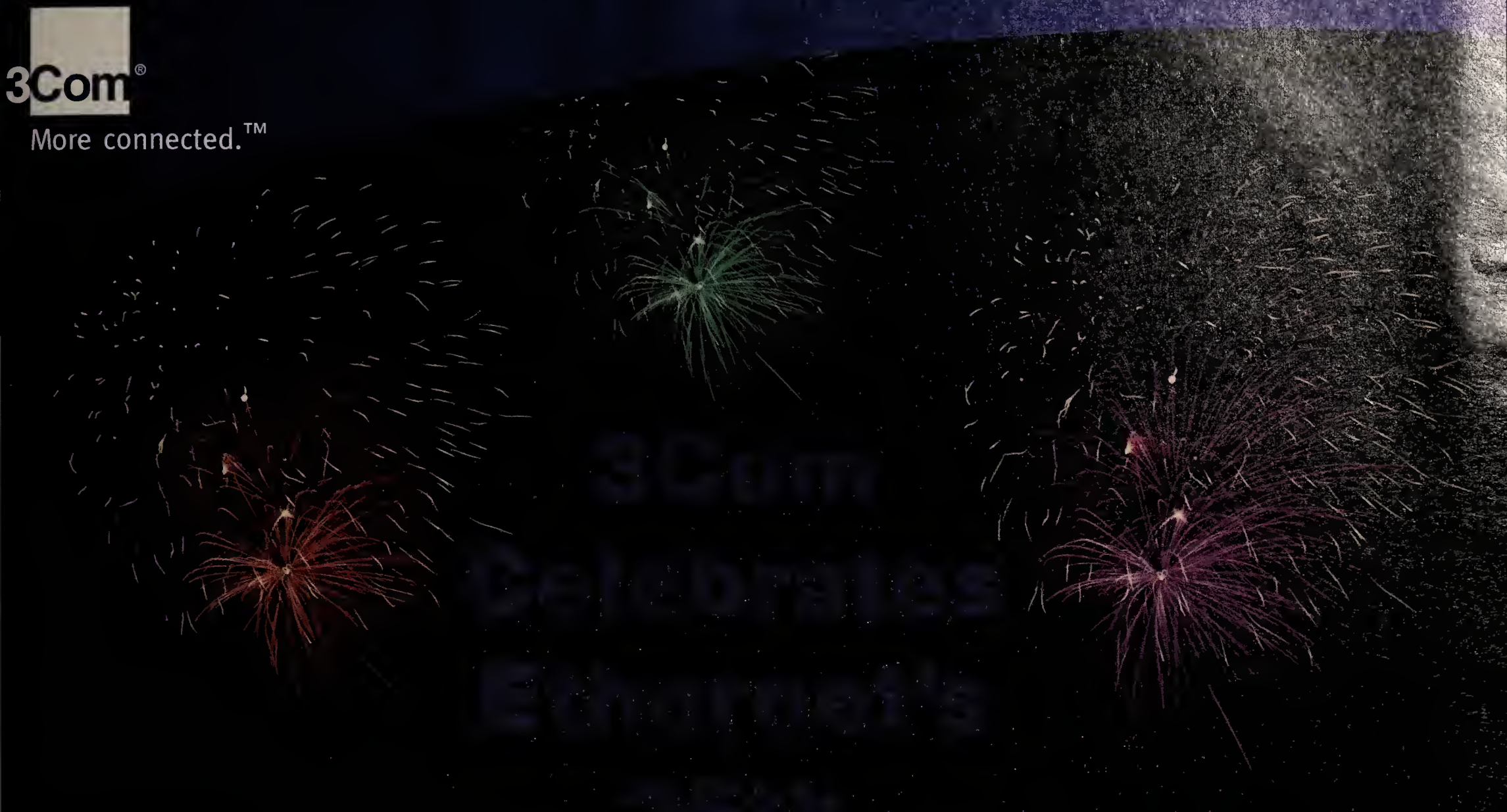
systems. The company now supports Microsoft Corp.'s Windows NT and several versions of Unix, including Solaris, AIX and HP-UX. "We haven't ruled it out, but we haven't seen yet where those customers want security," she said.

Check Point's announcements came hot on the heels of roller-coaster financial news. On April 22, the company announced record quarterly earnings. However, a day later, Check Point's stock plunged from more than \$40 per share to less than \$30 after a Microsoft executive said the giant software maker may enter the network security market.

Triant last week said that Microsoft's plans to include a firewall with its proxy server would not put it in competition with Check Point, which targets large enterprises.

One analyst agreed.

"It's perceived threat. It's not real," said Ted Julian, of Forrester Research, Inc. in Cambridge, Mass. "Anyone who is remotely interested in a Check Point product or any firewall is not even going to consider Microsoft's proxy server. It's a totally different product." ■



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Netscape enlists help to fight Wang lawsuit

By Sandra Gittlen

Wang Global has stayed quiet since filing a lawsuit in October against Netscape Communications Corp. and America Online, Inc. (AOL) over Web browser

technology patent rights. But Netscape last week pulled out the bullhorn to call on third-party developers who the company thinks can strengthen its defense.

Wang claims in its lawsuit, filed in U.S.

District Court in Virginia, that the company patented critical parts of today's Web browsers, including bookmarks and the ability to save Web pages locally using the "Save as" function. Wang said its

Videotex system patent, which was submitted in 1985 and received approval in 1988, outlined a product for storage and retrieval of digital information from a central server.

Wang is seeking an injunction against and/or royalties from the sales of Netscape and AOL browsers. And the companies could find themselves duking it out in court as soon as this summer.

Back through the future

To fight off Wang, Netscape has been trying to gather examples of browser technology dating back before 1985, when Wang filed for the patent. Netscape now has reached out to its partners for help by posting a plea on the company's recently created mozilla.org Web site for developers using Navigator source code.

If Wang is successful, and Netscape decides not to pay for the patent rights, key parts of Netscape's browsers might have to be removed, according to Julie Herendeen, director of client marketing at Netscape.

"If we have to take the claimed features out of the browser, then these developers are going to be affected," she said. "Therefore, we wanted to involve them."

Netscape described the Wang patent as "invalid, noninfringed and unenforceable" in an earnings report filed last month with the Securities and Exchange Commission.

"We do not believe the right thing to do is to pay Wang for the patent," Herendeen said. "If we did, we would have already paid them."

The lawsuit has prompted a response from AOL as well.

"We are optimistic about a resolution and will fight vigorously against the lawsuit," said Tricia Primrose, a spokeswoman for AOL.

Wang's lawsuit against Netscape and AOL focuses on three specific parts of the browser.

- The ability to save Web pages retrieved from a server using "Save as."
- Bookmarks technology, as used in Netscape's Bookmarks and AOL's Favorite Places, which allows users to rename favorite pages, but still access them quickly.
- The ability to view files based on their file extensions.

Microsoft Corp., which has its own stockpile of legal woes, was left out of the Wang lawsuit because Microsoft already owns the license to Wang's Videotex system. Wang sued Microsoft in 1995 for patent infringement on OLE, imaging and workflow products. Microsoft settled by buying the rights to Wang's entire patent portfolio. ■



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EC pioneers get the glory and the arrows

Early electronic commerce users report mixed results and strategies.

By Ellen Messmer
New York

Electronic commerce over the World Wide Web has America's greatest corporations scratching their heads, mulling whether EC will make them even greater or destroy them.

The answer, admittedly, is easy for some, like Dell Computer Corp., which brags it now rakes in a daily \$4 million in sales of equipment to business and consumers over the Web.

But for many others, Web commerce poses a terrible riddle because it can threaten established distribution and sales channels. The insurance industry, for instance, is locked in a great love/hate affair with the Web.

Progressive Casualty Insurance Co., for example, has started issuing policies online, and Web-based insurance agents, like InsWeb Corp., offer Web visitors a way to do comparative shopping and sign up for auto, home and life insurance.

But with traditional insurance agents complaining that the Web will wipe out their jobs, some insurance firms are struggling to find the appropriate course of action.

"The idea of making a tool that worked right the first time was another cultural change for Microsoft," said msnbc.com's Povich.

"We're not moving so much away from agents as to our customers," said Hugh Anderson, enterprise architect at ITT Hartford Group, Inc. While ITT Hartford uses the Web to advertise its insurance policies and generate sales leads, it only conducts actual transactions in auto insurance through an insurance partner.

"We don't want to anger the insurance agents," said Anderson, who spoke on the subject during a panel at last week's Gartner Group Internet & Elec-

tronic Commerce show here. "At some point, you need that expertise."

There are technical hurdles as well. Efficiently processing customer insurance policies via the Web will take a formidable amount of back-end integration with Hartford mainframe and workflow systems. "It's a major architectural nut to crack," Anderson said.



msnbc.com's Lynn Povich: "Microsoft believes news, sports and weather are the things people want to find out first."

Tide rolls into EC

At \$3.4 billion manufacturing giant Procter & Gamble Co., home of Folgers coffee, Tide detergent, Pampers diapers and Pepto Bismol, the MIS department is in ardent discussions with the company's marketing division on how to proceed in electronic commerce.

"Actually, the MIS department thought of it first," said Chuck

Patterson, senior systems analyst at P&G, though now the marketing department is hot on electronic commerce, too.

"We don't want to disrupt our marketing channels, so we're not going to sell [retail products like] Tide directly to the consumer," said Patterson. "But we want to figure out a way our retailers might do something like that."

While P&G is still creating a plan to lead its retailers onto the Web, those that have already plunged into electronic commerce will eventually be forced to answer the bottom-line question: Can you make money?

Some say yes. Advertising revenues are fueling Forbes, Inc.'s Web site, Digital Tool, and "for several months we've actually made money on the thing," said Steve Forbes, CEO of Forbes last week, hinting it was not, however, a lot of dough.

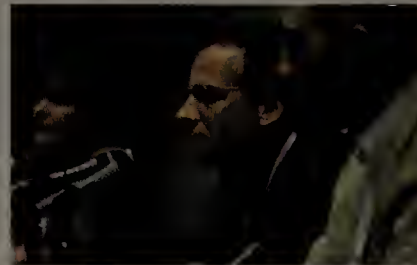
Unfortunately, a lot of content-driven Web sites, even ones with very high traffic rates such as msnbc.com, are still in the red.

A joint venture between National Broadcasting Co., Inc. and Microsoft Corp. that went live as a news site two years ago, msnbc.com has had its growing pains, acknowledged East Coast Managing Editor Lynn Povich.

Mixing reporters from different print, multimedia and TV

backgrounds has produced an uneasy "cultural" combination, said Povich. And Microsoft, which has supplied the Web technology for the venture, "wasn't experienced in developing tools for journalists," said Povich. "The idea of making a tool that worked right the first time was another cultural change for Microsoft." Povich added that Microsoft is more accustomed to putting out products with bugs that get fixed after they're released.

Credit-card transactions on



ITT Hartford Group's Hugh Anderson: "Who wants to buy an insurance policy on the Internet?"

the Web, now being done with ever greater frequency, are still problematic, because no one is using a standard way to process the card number between the

merchant's Web site, the bank and the card user.

A standard called Secure Electronic Transactions (SET), to be supported in SET-based browsers, gateways and digital certificates, is supposed to solve that problem.

But though SET 1.0 was finalized almost a year ago, SET deployment remains bogged down. Meanwhile, interoperability testing on SET products continues.

"The banking industry is very conservative, and they want to make sure the infrastructure is in place before they invest," admitted Steve Herz, VISA International, Inc.'s senior vice president of electronic commerce. ■

Vendors get down to business-to-business

Commerce One, Trade'ex, Ariba, Connect vie in pricey EC apps market.

By Ellen Messmer
New York

Last week brought a flurry of activity in the small but pricey niche called business-to-business electronic commerce applications.

Commerce One, Inc. shipped BuySite 3.0, the latest version of its software for electronic purchasing between buyer and distributor, which was retooled to work with a Web browser instead of a proprietary client. BuySite runs on Microsoft's soon-to-be available SiteServer 3.0 Commerce Edition.

The BuySite price tag can range widely — anywhere from \$50,000 to \$1 million. Plus if you use Commerce One's transaction service called the Electronic Commerce Network, it could cost your supplier 50 cents to \$2.50 for each corporate purchase you make.

One of Commerce One's competitors, Trade'ex Electronic Commerce Systems, Inc., said its three core products — Procurement, Distributor and e-Market Suite — will be overhauled and built on Java. The current version is written for HTML and is based on an electronic-catalog management technology from Requisite Technologies, Inc. Each product starts at \$100,000.

Connect, Inc., another business-to-business software vendor, announced it has blended the baseline functions of its PurchaseStream software (used in a situation with multiple sellers and a single buyer) with its OrderStream product (a sin-

gle seller with multiple buyers). The new Connect software product, MarketStream, is available now on Unix and will be available on NT in the fall. Pricing for MarketStream starts at \$100,000.

Does this all sound confusing? Think of it this way. These big-ticket business-to-business applications are all trying to automate purchasing between buyers and sellers by letting the buyer search electronic catalogs from multiple suppliers.

to-business software product called Operating Resources and Management System (ORMS), uses a catalog format developed by Silicon Graphics, Inc.

"It's called the Catalog Interchange Format, and Silicon Graphics put CIF in the public domain," said David Rome, Ariba's vice president of marketing.

ORMS typically costs \$1 million, but that didn't seem to phase Chevron Corp., which announced last week it had



Trade'ex has rebuilt its business-to-business application with Java. Shown here is Trade'ex's Procurement product for online catalog purchasing.

Everyone admits, though, that one major obstacle for electronic commerce is the lack of an existing standard for electronic catalogs. "There is no ANSI, ISO or IETF standard, so we picked Dun & Bradstreet's method called Standard Product and Code Service," said Thomas Gonzales, chief technology officer at Commerce One.

Ariba Technologies, Inc., which has a Web-based business-

signed on as a customer.

While the market is still very new — no one seems to have more than a dozen customers at best — interoperability is definitely a looming issue.

"Yes, there's the question of how a supplier processes an acknowledgment generated by multiple systems," said Gonzales. "This is what the suppliers are faced with in the marketplace." ■

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IP, ATM convergence products look to take center stage



By David Rohde
Las Vegas

Several vendors at this week's NetWorld+Interop 98 will announce products that should boost scalability, reduce latency and add real-time features for voice and multimedia application users.

For example, Sphere Communications, Inc. — a voice-networking partner of ATM vendor FORE Systems, Inc. — will demonstrate a Version 2.0 beta of its PBX replacement product called Sphericall.

Sphericall 2.0 uses wide-area ATM switched virtual circuits to let Sphericall telephony servers communicate with each other over an ATM WAN, reducing long-distance tolls. Sphericall 1.0 provides telephony call control features on a Windows NT server linked to a local ATM switch.

Sphericall supports a variety of network interface cards and gateways between the public switched telephony network (PSTN) and IP networks to bring phone calls back to the end user's analog phone or a multimedia PC (see graphic).

Because the new version works over an

ATM WAN, the product will potentially be able to support more than 1,000 users, as opposed to the typical small-office configuration of around 24 users.

With Sphericall, the company is also heavily promoting the advantages of voice over ATM vs. voice over IP. For example, ATM conversion takes 10 milliseconds — or 1/100 of a second — and due to the speed of the line, propagation delay could add another 40 milliseconds on a call from New York to London, said Kurt Jacobs, a product manager at Sphere. Most voice-over-IP products add several hundred milliseconds of delay.

FORE, a key distributor of Sphericall, earlier this year raised its equity stake in Sphere to 8.5%. Version 2.0 is expected to ship in July.

Gotta transfer

While Sphere looks for a foothold in enterprise networks, long-time No. 3 PBX vendor Siemens Business Communication Systems, Inc. will unveil a system that will let users of multimedia collaboration software, such as Microsoft NetMeeting, enhance their sessions.

The new HiNet RC 3000 system consists of several hardware and software components. The heart of the system is a rack-mountable gateway device

But they note the call-transfer feature is needed to turn the HiNet RC 3000 into a virtual automatic call distributor (ACD) for certain types of call centers, such as

CUTTING OUT THOSE TOLLS

Components of Sphericall 2.0, which provides network-based PBX functionality over an ATM WAN:

Sphericall component	What it is	What it does
CoHub	Card that resides in a PCI slot of a telephony server*	Converts outside calls from PSTN to ATM and vice versa
PhoneNIC	25M bit/sec or 155M bit/sec ATM PCI adapter card for clients	Provides voice transmission to multimedia PCs
PhoneHub	25M bit/sec or 155M bit/sec ATM adapter cards collected in a hub	Converts ATM to analog for transmission to standard phones
Network PBX program	Software that runs on a Windows NT 4.0 server	Provides call processing features
Client program	Windows 95 or NT client software	Provides GUI for computer telephony features

* One CoHub provides up to T-1 capacity. Number of CoHubs is limited by number of available PCI slots.



the size of a pizza box. The gateway converts traffic from the PSTN to IP and vice versa.

Users must also install signaling software from Siemens on a Windows NT server. The server software provides the real-time features to multimedia IP sessions. Each client PC also gets a specialized screen interface and requires at least a sound board, plus potentially a camera for video applications.

Siemens officials concede user demand for real-time telephony features for multimedia collaboration is minimal.

technical help desks. As a result, company officials claim the system could be an economical alternative to proprietary ACDs, which can cost thousands of dollars per agent.

The HiNet RC 3000 is scheduled for general availability in the fourth quarter. The system is expected to be sold by both Siemens and its internetworking partner, 3Com Corp. Since HiNet is designed to work best over switched Ethernets, Siemens officials are hoping 3Com sells the HiNet alongside 3Com's SuperStack II and CoreBuilder switching products. ■

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Symantec speeds file updates

Mobile Update takes advantage of existing e-mail systems.



By Andy Eddy
Las Vegas

Symantec Corp. this week will introduce Mobile Update, new client and server software for getting file updates to remote users faster and at a lower cost.

Mobile Update, which will be shown this week at NetWorld+Interop 98 here, takes advantage of the e-mail connection between an end user and his company's main office. The Windows NT server software monitors files on other servers at predefined intervals and then puts compressed attachments containing the file changes into messages for appropriate remote end users.

After a remote user has picked up messages, the user can double click on attachments generated by Mobile Update. This will open up the client-side Mobile Update application. The software uncompresses the file and makes the necessary changes to the original file. Mobile Update also provides virus protection and keeps track of version numbers. For

instance, Mobile Update gives an error message in the event the user tries to update a file with an older version.

Using Mobile Update can result in much faster downloading of files by end users because the software sends along only file changes rather than completely new versions of files. This not only can reduce dial-up network connection charges, but can also free up time for employees.

"Telephone charges are enormous when you have a remote staff. Mobile Update is a great way to update people on a regular basis at a lower cost," said Lon Orenstein, president of Support4U, Inc., a consulting firm in Dallas.

Mobile Update will be available at the beginning of June starting at \$795 for a 10-user package. The server is compatible with all Simple Mail Transfer Protocol and Post Office Protocol 3-compliant mail servers. The client software runs on computers powered by 486 or higher processors and running Windows 95 or NT.

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MCI

Continued from page 1

Specifically, the company's multimillion dollar InfoLink project moved MCI's 50,000

internal SNA users onto a TCP/IP backbone by eliminating more than 50 IBM 3745 front-end processors (FEP) and replacing them with 50 Cisco Systems, Inc. routers outfitted with Channel Interface Processors

(CIP). The CIP routers obviate the need for FEPs by making it possible to link SNA hosts over a fully routed backbone.

When the project's financial impact is fully assessed, MCI says the company will have saved \$16 million over three years — based on an investment of a little more than \$5 million.

By dumping its FEPs, MCI is saving \$3 million to \$4 million annually in FEP maintenance costs. The cost of the upkeep for the Cisco routers and channel-attached cards is about \$300,000 to \$400,000, or one-tenth that of the FEPs, said Tindal, senior network architect at MCI.

Not only that, with IBM's help, MCI has sold all of its 3745s to other user companies, making a roughly \$5 million profit.

Other savings are occurring as well. For example, MCI's FEPs were bound to a T-1 (1.544M bit/sec) line-speed restriction, Tindal said. The Cisco routers support T-3 line-speed (155M bit/sec) WAN links, which cuts latency by one-tenth of a second. Tindal estimates that improved access speed saves MCI \$800,000 annually.

The new net backbone also

lets MCI offer new services such as systems integration, consulting and SNA migration services.

"I would say looking back we knew we were taking on a real leading-edge project in terms of size and scale," Tindal said. "It was a challenge [because] the SNA people were never router jocks, and the router people never worked with [SNA] — we had a bipolar view of the world."

The decision to change from an SNA to IP backbone didn't happen overnight. Three years ago MCI had separate SNA and TCP/IP nets. The company gradually decided maintaining parallel nets was costing too much and was restricting employee access to corporate-wide MCI resources, Tindal said.

MCI's SNA environment was huge: 50,000 SNA users and 90,000 static SNA routes anchored by 25 IBM or Hitachi mainframes.

The net "was unwieldy in size, and the costs and administration were becoming prohibitive," he said.

support for technology such as Cisco's Data Link Switching (DLS+), which encapsulates SNA traffic in IP packets for transmission across the WAN.

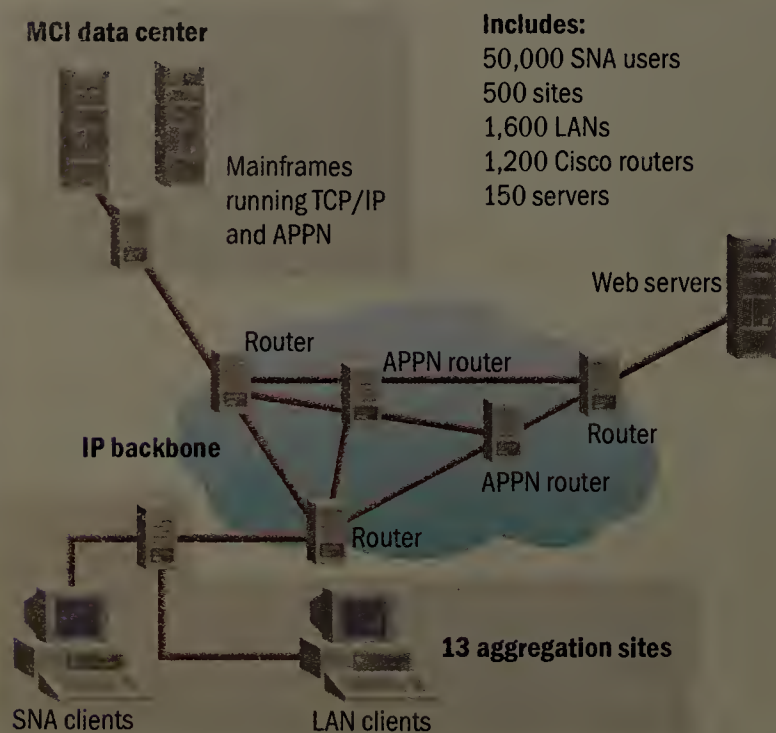
APPN traffic at the mainframe site is handled via dependent LU Requester/Server technology (dLUR/dLUS). dLUR and dLUS work together to set up an APPN pipe across the backbone. The dLUS function only runs at the mainframe site.

The mainframes are divided in to two to six logical partitions (LPAR) per machine, and each LPAR has two Enterprise Systems Connections (ESCON) to the CIP routers — one for IP, the other for SNA. ESCON is IBM's fiber mainframe channel connectivity technology.

The CIP routers are connected via T-3 links to 13 aggregation centers scattered across the country. The aggregation sites typically house two Cisco routers, one to handle local LAN traffic, the other to handle local SNA/APPN data. The routers

MCI's far-flung enterprise spans coast to coast

The new MCI network has SNA at the edges running APPN and Cisco routers pumping IP cross-country as the backbone.



Browsers

Continued from page 1

pre-everything," he said.

The edge Microsoft has in speed doesn't just stop with Internet Explorer under Windows 98, but extends to the experiences some users have with various NT betas as well.

"I have noticed that [Internet Explorer] had superior performance to some degree, mostly during initialization of the browser. I'm assuming that it is due to the tighter integration of the browser with the operating system," said Jason Olmstead, Internet services director at design firm Phat Media, Inc., who has been beta-testing Internet Explorer under Windows 98 and NT 5.0. He also noted that Internet Explorer under NT 5 only needed an additional 2M bytes of RAM but Netscape's Communicator 4.0 required an extra 11M bytes.

However, the issue may not be limited to just loading time. A number of test sites have told *Network World* that Netscape browsers also seem to run much slower than Internet Explorer under beta versions of NT 5.0 and Windows 98, as well as under the beta version of Windows NT Server 4.0, Terminal Server Edi-

tion. One user claimed in an e-mail to *Network World* that Microsoft's Winsock Dynamic Link Library isn't written to a standard API, which could bring about a performance hit on Netscape's browser because Netscape's browser looks for a standard API.

It's a claim that Microsoft strongly disputes. "Everything we use with [Internet Explorer] is completely open and completely documented. There are no undocumented APIs that we're taking advantage of with Internet Explorer," said Craig Beilinson, product manager at Microsoft for Internet platforms and tools.

Performance priority

Beilinson said Internet Explorer's performance was a high priority from the start, and several changes were made to meet that goal. For instance, use of a component architecture loads only the features you need into memory; and support for HTTP 1.1, dynamic HTML and Microsoft's "virtual machine" for Java all promise a boost in performance.

"Personally, I prefer Internet Explorer because of the performance," said Richard Soh, senior systems engineer with a major New York investment com-

pany. Yet, the investment company standardized earlier on Netscape, and Soh does not expect to change for some time.

Netscape may have trouble overcoming the speed deficit. "When you take something and embed it in the operating system, it's going to run faster," said Rob Enderle, senior analyst at Giga Information Group in Santa Clara, Calif. "Unless Netscape does its own tuning, which is unlikely, then its browser will be slower than Internet Explorer."

Not only does this issue directly affect Netscape's browser share, but it also impacts other revenue centers, such as the Netcenter Web site and the enterprise-software product line. (Netscape was contacted for this story but declined to comment.)

"I think that [continuing to lose browser market share] is something that Netscape should be losing sleep over," said Jeetu Patel, vice president of research at Doculabs, a research company in Chicago. "It needs to keep browser share to sell servers. If market share goes down significantly, it'll affect the revenue. ■"

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Team MCI: responsible for migrating the network. Back row (left to right): Kristin Thorson, Greg Lindstrom, Michael Hogan, Steve Alden, Patrick O'Connor, Ray Schumacher, Bob Zapf. Middle row: Dee Hodge, Jay Buddiga, Don Mariani. Front row: Glen Tindal, Laurence Kung, Joe Berkeley.

As if moving to an IP backbone wasn't a big enough task, MCI also moved its traditional 3270-based SNA users to IBM's Advanced Peer-to-Peer Networking (APPN) technology to take advantage of improved performance and reduced administration qualities.

Piecing it together

The components of MCI's new net read like an acronym-lover's paradise. At the central site, MCI installed the latest level of VTAM (Version 4.4) on the IBM mainframes. VTAM controls SNA communications.

The Cisco 7000 CIP routers run IOS 11.1. Together, VTAM and IOS support the technology necessary to run SNA and IP to the mainframe. That includes

also support DLS+ and dLUR.

Ultimately, the new net backbone will enable MCI to make moves, adds and changes much more efficiently, Tindal said.

InfoLink will also let the company better handle increasing IP traffic. Even SNA traffic has continued increasing, the company said.

MCI also thinks its network is a groundbreaker and the envy of the industry. "Many companies would like to do what we've done," said one MCI staffer. "We've set a precedent on what companies are able to do [when integrating SNA and TCP/IP]. ■"

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VPN fears

Continued from page 1

"If it's not secure, I lose my job," said the network administrator for a major pharmaceutical company.

He said he is worried about packet security over the Internet and the performance delay encryption can introduce. It will be a year before he is even ready to run a pilot VPN. "It all sounds great in theory, but I will not be bleeding edge," he said.

The network administrator for a Washington state insurance claims firm was not worried so much about the security of the Internet. It would be difficult to capture encrypted packets that travel diverse paths across the Internet and piece them together, he said. "The greater danger is people having a way to get in through your firewall," he said.

Safe or not, administrators have to deal with whether their bosses think the Internet is not secure, said Ann Melton, laptop deployment administrator at Raytheon TI Systems, Inc., in Dallas.

"The Internet scares the devil out of everybody. Is the tunnel really secure, and how do we prove that? There's a perception that what is there is not secure,

and it will be a big selling job to get [doubters] to agree [VPNs are] a good thing," Melton said.

Manage this

While security was clearly a leading concern, administrators looking to implement VPNs were also worried about managing remote users. All interviewed agreed that once proven, VPNs

laptops more difficult, according to the city's network administrator, Wylie Stokes.

Stokes wants management tools that check whether remote clients have current software versions that are properly licensed.

A network administrator from Maine Medical Center, in Portland, said she, too, needs more efficient management of

network administrators have to crunch the numbers to determine whether VPNs really do save money. The theory goes that remote dial users make a free local call to an ISP, and ride the Internet back to corporate headquarters, thereby ducking toll calls.

That sounds so deceptively simple that it is difficult to con-

Gartner Group estimates annual remote access costs through 2001 will range between \$4,841 and \$13,741 per person, not including workstation costs.

Stokes said he is looking for a way to sell VPNs to city directors, who think the infrastructure is in place for anyone with Internet access to hook up with the city government network. They do not realize the costs involved, he said. "The [city] directors ask, 'You just dial [the Internet] up and you get [a VPN], so why do you need such a big budget?'" Stokes said.

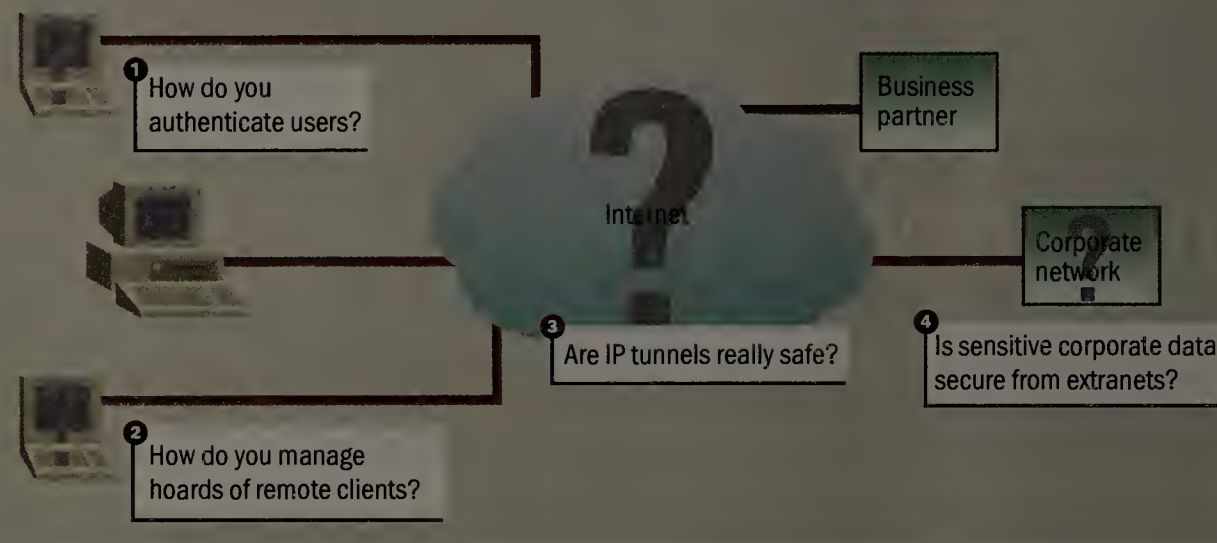
Melton said she believes it could cost a company less to set up a VPN than a direct dial network. But she was not sure whether VPNs would be a cheaper option when expanding an existing remote access network.

Despite major questions, the potential for savings with VPNs is still alluring.

The advent of inexpensive broadband access to VPNs via digital subscriber line and cable modems, and IP service providers developing assured quality of service, sweeten the prospect of VPNs even more, Melton said. ■

DO YOU REALLY WANT A VPN?

Users are intrigued by the potential benefits of VPNs, but wary of potential trouble spots.



will dramatically increase remote access use.

Even without a VPN, the number of remote users among city employees of Coral Springs, Fla., is booming. The increase makes managing the remote PCs and

remote client software. Mary Lou Johnson spends increasing amounts of time talking users through problems that remote management software could eliminate.

Management hassles aside,

vince higher-ups they need to make any capital investment in a VPN.

But the costs of setting up a remote PC or laptop, installing VPN security and administration are not trivial, Stokes said.

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Interop

Continued from page 1

show with new VPN offerings.

VPNs are an increasingly popular option for linking employees or business partners over the Internet. Ideally, a VPN provides security and management attributes that promise a less expensive way of linking remote users to corporate net resources than traditional private dial-in lines.

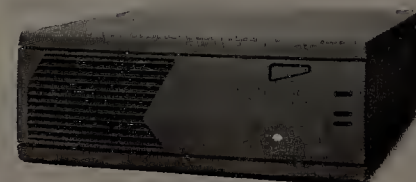
According to industry experts, what most vendors call a VPN consists of encrypted

TCP/IP links between LANs with some sort of firewall included. There are variations on that theme, many of which will be on display at N+I.

Bay Networks will announce a scaled down version of the vendor's VPN gear to let small enterprises and branch offices communicate with remote users or trading partners over the Internet.

The Bay ES 1000 can support up to 50 simultaneous users dialing in to the corporate network via the Internet. The ES 1000 encrypts and decrypts traffic as it

passes through the device's single T-1 link to the Internet. Larger boxes in the Bay VPN family support T-3 connections as well as T-1s.



Bay Networks' ES 1000 supports VPNs for small enterprises.

In addition, the ES 1000 sports new operating software that adds L2TP, which is encryption for setting up secure IP connections called tunnels across the Internet.

ES 1000 also comes with software that can encapsulate Novell Network, Inc.'s IPX traffic in IP packets for transport across the Internet. The software also supports using Novell's Netware Directory Services to assign access rights to remote users, making it simpler to administer the VPN. The new box costs \$7,000.

While Bay offers a single-box designed specifically to enable VPNs, Ascend plans to roll out a

VPN scheme that lashes together multiple existing products.

The company's MultiVPN package defines how corporate users and ISPs can set up VPNs using Ascend dialup routers, access switches and core switches. Ascend's MultiVPN package will support remote access over the Internet and provide a way to guarantee IP service quality across service provider networks.

As part of MultiVPN, Ascend will also announce IP Navigator VPN Routing, which lets service providers guarantee customer IP service levels. The company will also announce support for multi-protocol label switching, which will let users belong to multiple VPNs.

Also at Interop

Sources said IBM's Networking Software Division will be announcing a slew of VPN and related IP security products across the company's server and router lines. One of the keys to this will be the addition of IP Security (IPSec) for encryption and key management. IBM declined to comment on the

announcement.

Assured Digital will present for the first time its ADI VPN product family, which includes client software, management software and IP edge switches for sending encrypted data across the Internet. ADI gear also authenticates users trying to gain access to central sites. ADI's Automated Operation and Security (AOS) system in each device supports IPSec, ISAKMP/Oakley encryption-key management, and Point-to-Point Tunneling Protocol (PPTP) encryption.

Indus River is promising to deliver IPSec packet-level authentication and encryption to users in its RiverWorks VPN gear within 90 days. Unique to RiverWorks is a client database of local phone rates used to find the least expensive way to connect to the Internet. RiverWorks also stores profiles of user groups for assigning access rights.

Staff writer Marc Songini contributed to this story.

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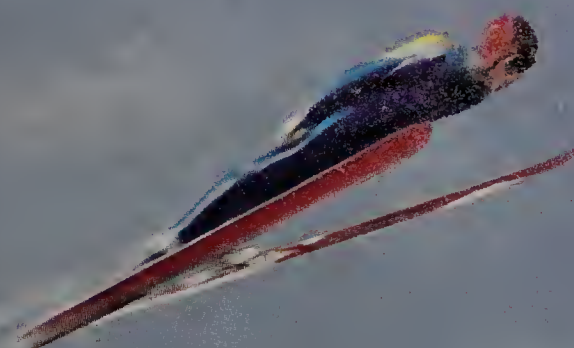
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Anti-data, patterns and inflatable undies

Tokyo commuter Katsuo Katugoru caused havoc on a crowded tube train when his inflatable underpants unexpectedly went off. The rubber underwear was made by Katsuo himself and was designed to inflate to 30 times their original size in the event of a tidal wave. "I am terrified of water, and death by drowning is my greatest fear," said Katsuo, 48.

— Unsubstantiated story carried March 3, 1998, by London's *Daily Telegraph*, National Public Radio and many other serious news organizations.

What's interesting about this story (other than the weirdness) is the coverage the story received.

According to some reports, The Associated Press sourced it, but no one has been able to find any AP reference. You have to wonder how the likes of NPR and the *Daily Telegraph* could run with it.

What the event illustrates is a phenomenon that will become increasingly common — the Internet raising gossip, jokes and misinformation to the status of truth. This is what I call "anti-data." Anti-data is not the opposite of data, rather it is the stuff that dilutes and invalidates the data you need.

Part of the reason anti-data exists is because the Internet supports the rapid transfer of huge amounts of what we'll call, for the sake of argument, "news." Way back in 1967, Marshall McLuhan noted the consequence of speedy news delivery as a general trend of modern media in "The Medium is the Message: An Inventory of Effects," (p. 63):

Information pours upon us, instantaneously and continuously. As soon as information is acquired, it is very rapidly replaced by still newer information. Our electrically configured world has forced us to move from the habit of data classification to the mode of pattern recognition.

The Internet amplifies this effect and applies it not only to news but also to intelligence about markets, people and business concerns in general.

To corporations, this should be a great concern. As your employees begin to rely on pattern recognition over data analysis, generally their judgment will become less consistent.

Their correct conclusions may well become more accurate, but their wrong ones will tend toward the catastrophic. These extremes might average the same as prior judgments, but the fact that

the highs are stellar and the lows, abysmal, will induce chaotic behavior.

This obviously has implications for fast-moving environments such as financial markets, but many other businesses will be similarly affected. How your

organization judges the behavior of the competition, perceives market conditions and reacts in scores of other areas where judgment and insight are required are going to become crucial concerns.

This is the province of the chief knowledge officer — the person tasked with understanding and managing corporate data resources.

But most of the things CKOs are concerned with today revolve around legacy data because it contains so much value.

Unfortunately the problem of how staff will handle informational environments is one that is going to sneak up and cause you trouble before you're ready to deal with it.

Training staff in information handling is what is needed. This should cover verifying sources, ranking data for relevance and problem solving techniques. Also important is to include how and when data should, and should not, be communicated to others. CKOs (and chief information officers without a CKO to rely on) had better start thinking about this before it is too late, and the tidal wave of Internet data and anti-data washes them out. That's when you'll wish you had the computer equivalent of inflatable underwear to save you.

Sartorial comments to nwcolumn@gibbs.com or (800) 622-1108, Ext. 7504.



Mark Gibbs



'NET BUZZ

The latest on the Internet/intranet industry

By Chris Nerney

STAND-UP FOR GEEKS Thank you, thank you, thank you. It's great to be here in Vegas during NetWorld+Interop 98. We tell ya, we don't get any respect. We were standing in line to register for the show and a security guard said, "Hey, you should be in the IEEE line." And we said, "That's the IETF to you, pal!" We tell ya, we don't get any respect.

Is this thing on?

We were meeting with this vendor and they asked if we wanted to try their software, and we said, "Hey, these days, that's all we have is software!" That's it, that's all we have!

What am I in, a funeral parlor? Or a Netscape sales meeting?

You network managers, don't forget, when you're in Vegas for Interop, be ready to gamble away everything for which you've worked so hard. Otherwise, just leave the convention show floor and try your luck on the gaming tables. Get it? Because it's a risk to make a commitment to any vendor's technology, especially a start-up's.

Do we have to connect the dots for you people? Or perhaps we should say "pixels"?

C'mon, pixels! It's an inherently funny word! What's wrong with you? Snap out of it, or we'll do a product demo.

Hey, what do you get when you run Java across multiple platforms on an enterprise? We don't know, it hasn't happened yet!

Ooh, that one touched a nerve. Where's the tall guy with the teeth going?

We heard Interop wanted to honor the people who have made the most money on the Internet, but they're all at Adult Dex.

Give us a break. This is just a beta version of the act.

There's always a lot of venture capitalists at Interop. You can tell by the faint odor of sulfur. Sulfur, as in Hell. Like where we are now.

Speaking of Faustian bargains, we heard Microsoft was in town. Of course, Microsoft has had problems with the U.S. Department of Justice lately, so to improve the company's image Bill Gates bought R.J. Reynolds.

OK, not a political crowd...

ONLINE IS ON DEAD Troubled Internet conferencing software vendor OnLive Technologies was quietly bought out recently by Electric Communities in a deal arranged by Softbank Holdings, a major investor in both start-ups.

Electric Communities, based in Cupertino, Calif., develops virtual community software designed to enable electronic commerce.

As far back as last summer, *Net Buzz* had heard rumors that OnLive was looking for a buyer (NW, July 21, 1997, page 65). But one former OnLive insider said Softbank and other investors vastly overvalued the company, driving away potential buyers.

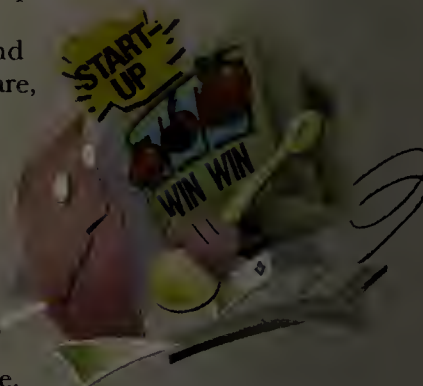
While Softbank is calling the deal a merger, our source says it's more akin to a fire sale because poor sales left OnLive with few assets.

Founded in 1994, OnLive developed software that enabled Internet users with microphones to talk in real time through their computers. In addition to voice communication, the software featured a 3-D interface that allowed users to create cartoonlike avatars to represent themselves in the virtual community.

OnLive's initial market was Internet users who were into chat rooms and virtual reality fantasy games.

Soon realizing that none of these people was employed, the Sunnyvale, Calif.-based company last year changed strategies, focusing on selling products to corporations that wanted to use the Internet for real-time group business communications. But no one was buying the stuff.

Here are some *'Net Buzz* blackjack tips: Take a hit when you're showing 16 or lower, unless you feel really lucky or are desperate. Also, sometimes the dealer will feel bad for you if you lose a lot. Ask the dealer for your money back and offer to treat at a luncheon buffet. A coquettish glance toward the pit boss also can be effective. Those are our tips. Where are yours? Contact Chris Nerney at (508) 820-7451 or cnerney@nww.com.



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